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The Valley and its People

The Valley and its People

A Portrait of TVA



Text by R. L. DUFFUS

*Illustrations by the Graphics Department
of the Tennessee Valley Authority
CHARLES KRUTCH, Chief*



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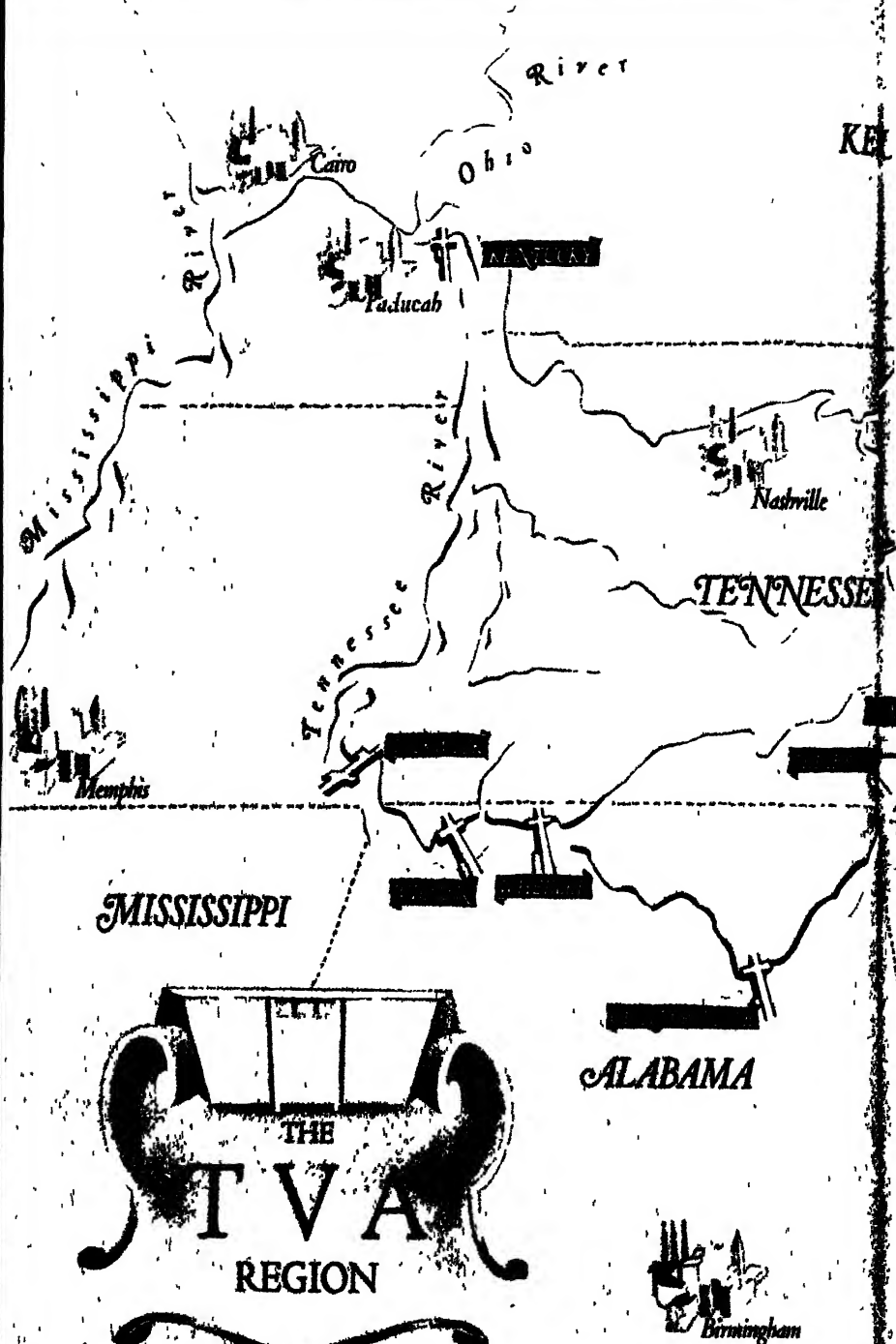
1946

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ICKY

VIRGINIA

Bristol

SOUTH

HOLSTON

NORTH
CAROLINA

Asheville

SOUTH
CAROLINA

GEORGIA



I.

This is the Valley

THIS is the Valley of the Tennessee.

If our airplane could rise high enough and our eyes were keen enough we should be looking down on an area four-fifths as large as England, in which many rivers gather to the Tennessee, the Tennessee swells the Ohio, and the Ohio is received into the bosom of the Mississippi.

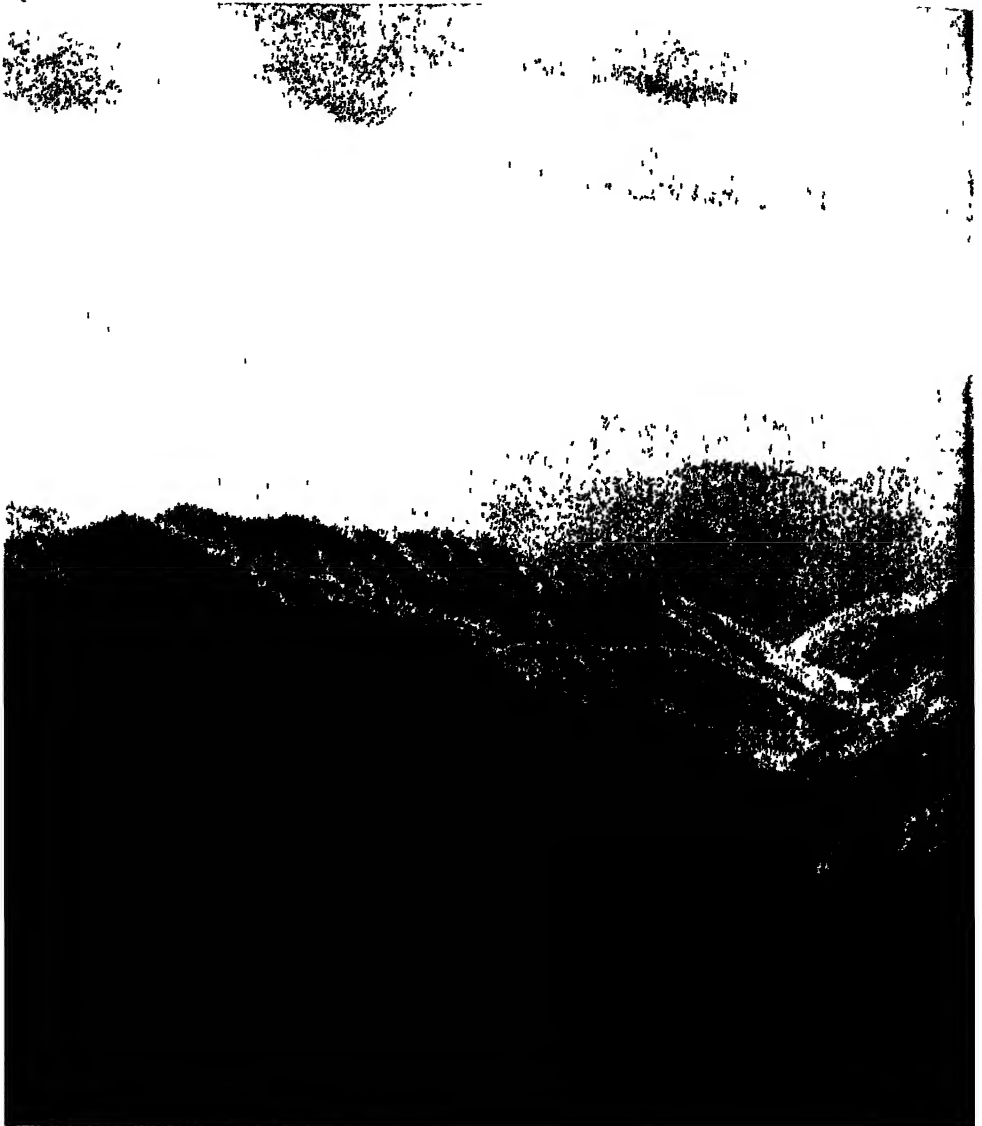
We could easily understand why this landscape, often so dreamy, so lazy-looking, is filled with power. In the east lie the ridges and peaks of the southern Appalachians, the Great Smokies, rising to heights of more than a mile and a quarter above sea level; and in among the ranges are long valleys, running from northeast to southwest, down which come the waters of streams fed by an annual rainfall, in these mountains, of eighty inches a year. The rain clouds we see gathering may be soft and gentle in appearance, but in a year an acre of land receives six thousand tons of water.

This water, moving as it must, seeking the ocean level, carries an energy almost beyond the imagination of man. It more than matches the great strength which thrust the hills up millions of years ago, for little by little it undoes what was then done.

The larger tributaries coming out of the mountains—the Powell, the Clinch, the Holston, the French Broad, the Little Tennessee,

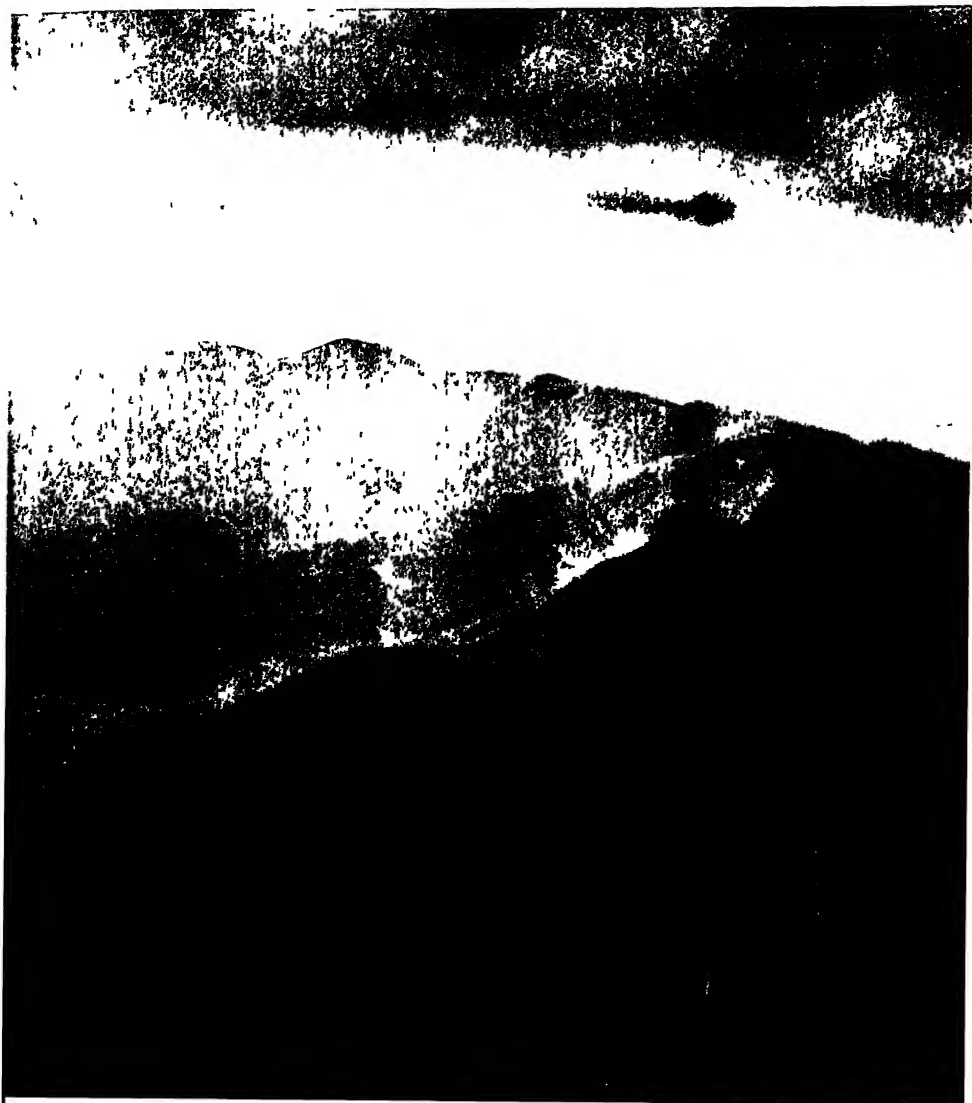
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the Hiwassee—gather their waters from countless sources among the high places, bring them down thousands of feet, and deliver them into the main river at elevations of seven or eight hundred feet. But as the rate of fall diminishes, the volume of water increases. Power is in the tributaries and in the main river, all the way to the junction with the Ohio; sometimes turbulent power,



sometimes quiet power; power to do much harm, power to do enormous good.

Power has been there from the beginning of man's time, and before. Power took the white pioneers downstream to make the first settlements, or to go through the Valley on their ways southward and westward. Power turned their first little mills on the high



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slopes and the small streams—and turns some of them still—before the force of the big streams could be used. The power of the water shaped and made the land, and the power of the water, majestic, indifferent to human fate, carried away the fertile soil.

The water went where it must, obedient to the same laws that govern the movements of the Milky Way. Looking down from our swooping plane we see why it went where it did.

The main river, forming at Knoxville, makes a huge southward bend, not for beauty's sake, but to get around the Cumberland Plateau, just as the Cumberland River had to make its way around this obstruction on the north. The Plateau, green, brown, and gray by areas and by seasons, is a region of thin soils; but on the west it gives way to lower, more fertile fields, to a land of green growth, of orchards and of cattle, to the bluegrass area of middle Tennessee, finally to a land of cotton and of old plantations.

We may well believe, as our obliging pilot circles or swoops, that this country of the Tennessee is one of the loveliest on the face of the earth. It has the majesty of a great simplicity. The springs and rivulets of the mountains yield water in abundance, the river takes it away. The broken highlands of the east have yet a symmetry of their own, like a single breaking wave. The wave swells, subsides, swells again, sinks at last on the southern and western strands. The shape of the Valley satisfies the yearning for drama and the desire for peace.

There are hidden coves, we know, where no rough wind from the outer world stirs the leaves and where the moisture descends drop by drop through moss, and there are these visible wide spaces open to all weathers, like the rolling hills of Wisconsin or the billowing fields of Iowa.

From this height, indeed, it is easy to believe that here could rise a benign and happy civilization.



The Valley and its People

The broad outlines are as they were a thousand years ago. They are what the hawks saw when the flatboats were on the Tennessee, when the Indians sent flights of arrows as the settlers floated down past Lookout Mountain, when wagons were being hauled painfully across the mountains from North Carolina into the Watauga settlements, when some of the traffic coming through the Cumberland Gap turned southward toward the Nashville region.

But man has changed the scene, as invariably he does. We see no more than fourteen million acres of woodland. There were twice that many when the white man came, swinging his axe to bring in sunlight for his corn and to make room for grass for his pastures. Where the forest was, too often now there are worn-out slopes, gullied, ruined. The sedge grows brown where nothing useful to man will any longer take root. Two and a half million acres of land have passed almost beyond redemption. Another four and a half million acres are sick with the disease of over-cultivation and the wrong sort of cultivation. These are the marks of about a century and a half of the white man's occupancy.

So much we are told, and some of it we see, as we hover with the hawk. But we see, too, what man has caused to grow. We see his smoking cities, Knoxville and Chattanooga on the main river, Nashville on the Cumberland, drawing on the fertility of the phosphate-laden soils to the southward. We see many a factory along the river, some with yesterday's newness still on them, and the tumult of war seems to sweep across the peaceful landscape.

We see the roads converging on little towns, each with its schools, its churches, its main street fronted with stores, its homes, lawns and shade trees, its movements of motor cars and people. Shabby, sleepy little towns, some of them, yet the products of a bygone hope and dream. Livelier little towns, touched by some magic not visible from the air. All of Tennessee, a little of Virginia,

This is the Valley

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a little of North Carolina, a corner of Georgia, a half-circle of northern Alabama, a slice of Mississippi, a part of Kentucky: in all of these there lie the little towns and cities, in the mountains, in the valleys, on the plateaus, on the alluvial plains, containing so much of the failure, the intimacy, the poverty, the narrowness, the neighborliness, the sweetness and hope that are America.

Across all this region, in the summer of 1933, a new human enterprise began to write its signature: the Tennessee Valley Authority. TVA! Let us look closer and read. For a decade, for the first time, the hand and brain of man have been operating to make all the powers and resources of the Valley work together for the



This is the Tennessee Valley at its best. It won't stay this way unless the land is cover

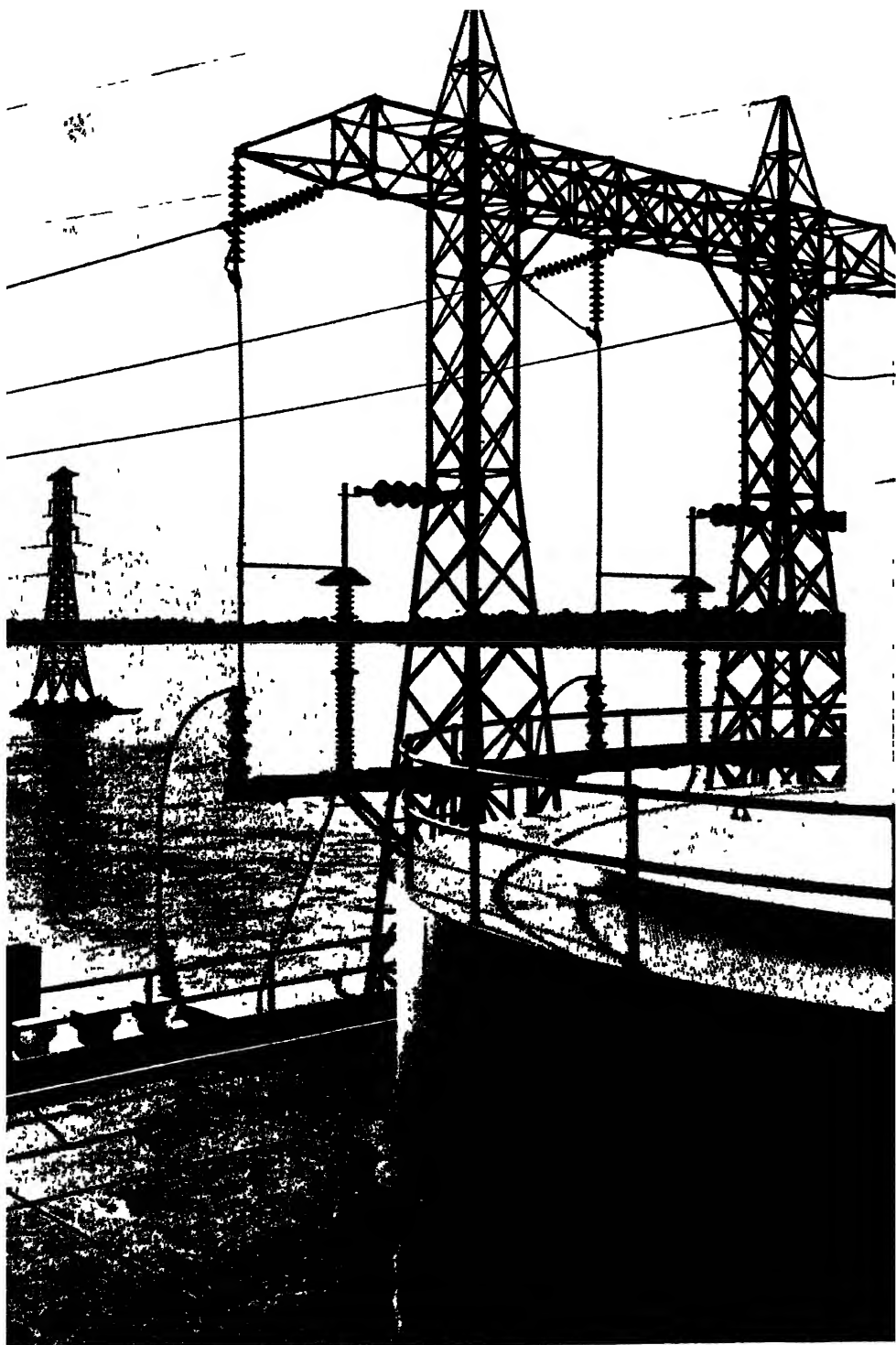
benefit of all the people. As we circle serenely high in this clear air what can we see of the results?

We can see the glimmer and glitter of dammed-up water behind Norris Dam, backing up the Clinch and Powell rivers; behind Cherokee on the Holston and Douglas on the French Broad; far up in the Hiwassee's mountainous channel; making lakes in the main river behind the Fort Loudoun, Watts Bar, Chickamauga, Gunter'sville, Wheeler, Wilson, and Pickwick dams. We see the signs of gigantic construction work at Fontana in the headwaters of the Little Tennessee, and at the Kentucky Dam, not far above the Ohio River junction near Paducah.

Let us swoop low over these dams. Their bulk is foreshortened in this view, but we note the sharp perfection of their forms. Being built for strength, accurately proportioned to a purpose, they have a geometrical, effortless beauty. Every line, every angle is in its right place and has taken a certain shape because it has work to do. Some of the dams are as lovely as the hills, which they both interrupt and complete.

So now we understand that the main river, six hundred and fifty miles of it from Knoxville to Paducah, and hundreds of tributary miles, have passed in a little over ten years' time into the hands of man. Man, indeed, cannot control the rainfall. He can alter the courses of streams only slightly. The water that falls on the high places must eventually go down to the Ohio, the Mississippi, and the sea, and by the ancient routes.

But man can determine somewhat the time and manner of its passage. He can hold it back to prevent floods. He can send it through turbines to produce electric power, and release it in such fashion as to make a dependable channel for ships. By painstaking attention to little streams, to exposed slopes, to the method of his cultivation, he can keep it from washing away the soil.

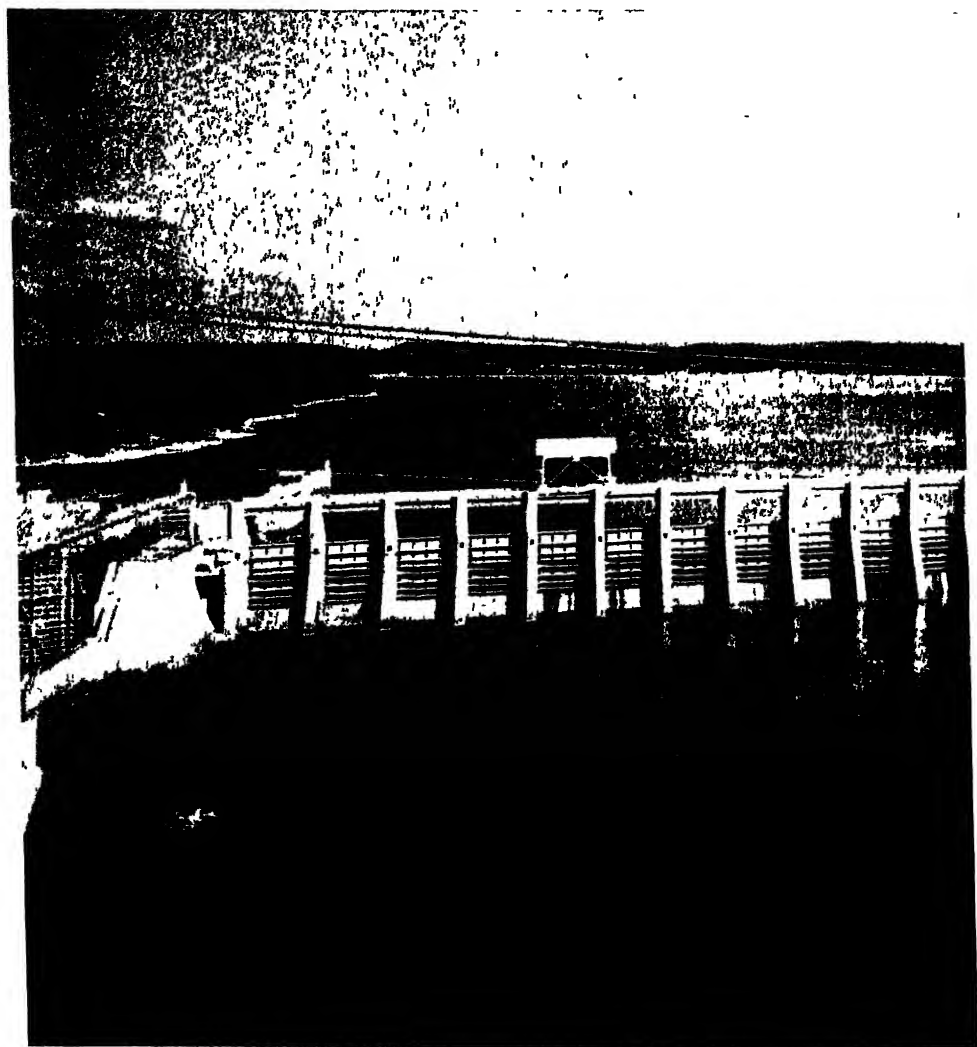


Wheeler Dam. Sometimes it is possible to turn the generators outdoors, protecting th

The Valley and its People

To study the Valley in this way is like reading the history of some land a long way off, and a long time ago. Beauty, waste, and attempted redemption are simple ideas which this hawk's-eye view readily gives us. They are as simple as the purposeful lines of marching towers which lift the power lines on their shoulders and take them where they are needed. They are too simple.

They leave out people. And the past, present, and future of this Valley, and of all valleys and all plains, are meaningless except as



we consider them in terms of human lives. The story of the Valley, which will never be told, is the story of all the lives that have been and are being lived here. So many people here have lived, struggled, suffered, laughed, dreamed, died. Has the quality of life here ever risen to match the quality of its superb natural setting? Can it be made to do so?

We must get back to earth to be sure. We must take into our lungs directly the dust and smoke of the cities, the aromas of fields,



The Valley and its People

woods, and barnyards. We must feel the weariness of people as they go home from work. We must look at the Tennessee Valley from the level at which men must mostly touch it. Then we may be able to learn what has been done to it, and what may be.

So we circle for a landing. The land comes up at us, tilts, and straightens. We step out.

This is the Valley of the Tennessee.



These men have done a day's work—work that will make possible for some to come

“The National Defense”

THERE was one part of the Valley we did not fly over after the fall of 1943. There was one part of the Valley that was not publicly alluded to between that time and the end of the first week of August, 1945. A great bloc of TVA power went into this area of mystery. The railroads shunted in train-loads of undescribed raw materials. A new city, two-thirds as large as pre-war Knoxville, grew up. Seventy thousand workers, ranging from unskilled day laborers to scientists whose day's labor no layman could understand, were on the job. Most of these workers did not know what they were producing.

What came to be known as Oak Ridge covered 59,000 acres of Roane and Anderson Counties, eighteen miles northwest of Knoxville. Some of it bore the old name of Happy Valley, but before TVA came into the district it had not been too happy. And despite demonstrations of better and more profitable farming the land was worn and poor. Here was deposited a modern metropolis, complete with sewage, water and electric systems, schools, hospitals, churches, motion picture theatres, police and fire protection, bus lines carrying more than 100,000 passengers a day. And here, not too close together, were great and strange new manufacturing plants, one with three miles of wall enclosing 600 acres, another with seventy buildings covering 700 acres.

Not far from a pilot plant producing an element heretofore unknown to man stood an old log cabin below the brow of a sedge-overgrown hillside. The nineteenth century, even the eighteenth, looked with wonderment on the twentieth and toward the twenty-first. Some people, watching these things, began to wonder if there was going to be any twenty-first.

On August 6, 1945, came the news from Hiroshima. Then the story, or a part of it, could be told. TVA had been instructed to promote the national defense. At Oak Ridge it had done so by pouring its power into the production of material for the first atomic bombs. Cherokee and Douglas Dams, built in such frantic haste, were dedicated to that purpose. Fontana and Kentucky were hurried to completion to make sure that the output was sustained. The waters of the Tennessee River system were concentrated into power of unprecedented and inconceivable violence. And yet Oak Ridge was only a part of World War II in the Tennessee Valley. That war was one of farmers and soils as well as industry. Here, on the land and in the factories, were nurtured and tended the buds of victories that, transplanted, bloomed red all around the earth.

War had been here before. Historians had counted hundreds of engagements in this region between 1861 and 1865. Shiloh, Murfreesboro, Chattanooga, Lookout Mountain, Missionary Ridge, Chickamauga, Franklin, Nashville, are some of the names. In quiet places you came upon markers, sometimes upon military cemeteries.

But this generation's war in the Valley was different. It was the war of a united nation, without an enemy here visible—unless you count the Nazi saboteurs who were caught with plans for blowing up the power lines and so “freezing” the aluminum plants; or, as some people think, impeding the experiments at Oak Ridge. It was a war without bloodshed, except as a worker fell to his death from

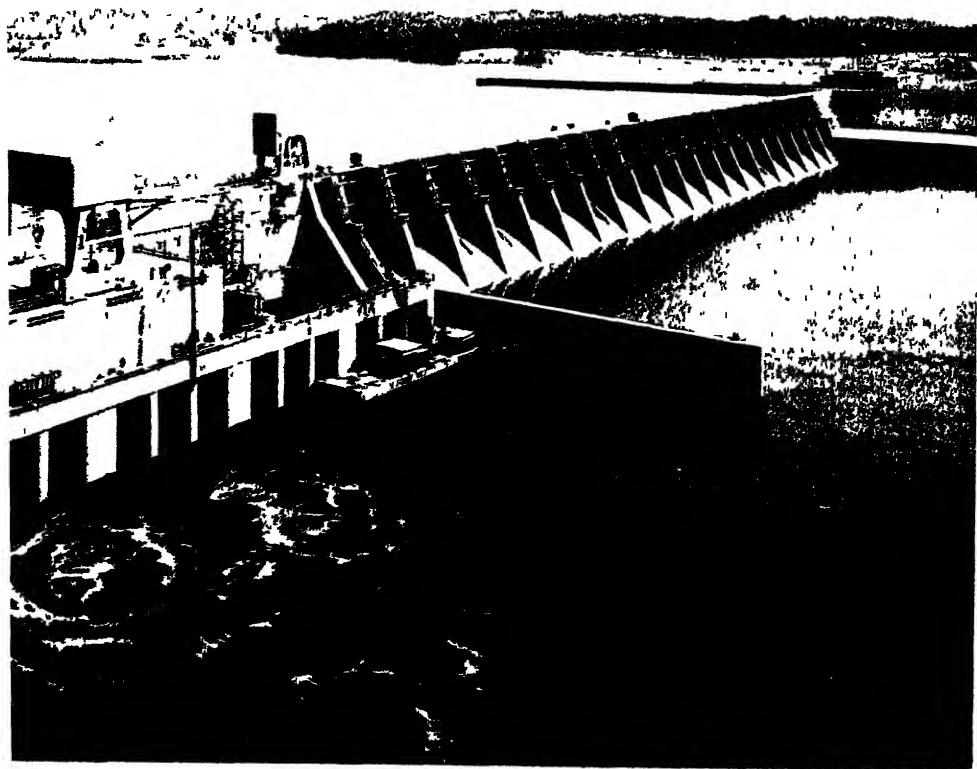


Dicks Creek Dam The river that just ran down hill now makes electric power.

a dam under construction, or was caught in a machine, or a test pilot tried his luck too often, or a flier in training lost his way in a fog, or there was an explosion in an arsenal.

Nevertheless, it was war. Here was the power of war, accumulating at first slowly, like the water behind a dam, then sent to far places to be released in swift terror.

The Tennessee Valley Authority was ready. One week after the German invasion of Poland, in September, 1939, as Chairman David E. Lilienthal has testified, TVA "had submitted to the President a comprehensive memorandum indicating specifically . . . those



Watts Bar Dam. Dams are lifted from the ground by the power of the water.

courses of action in respect to a national emergency which the TVA was equipped to carry out.” War or no war, one course of action had been followed from the first. It was Mr. Lilienthal’s belief that when you prepare well and truly for peace, when you raise human levels of living and working, when you set free the creative abilities of a people, you prepare also to defend this birth of freedom.

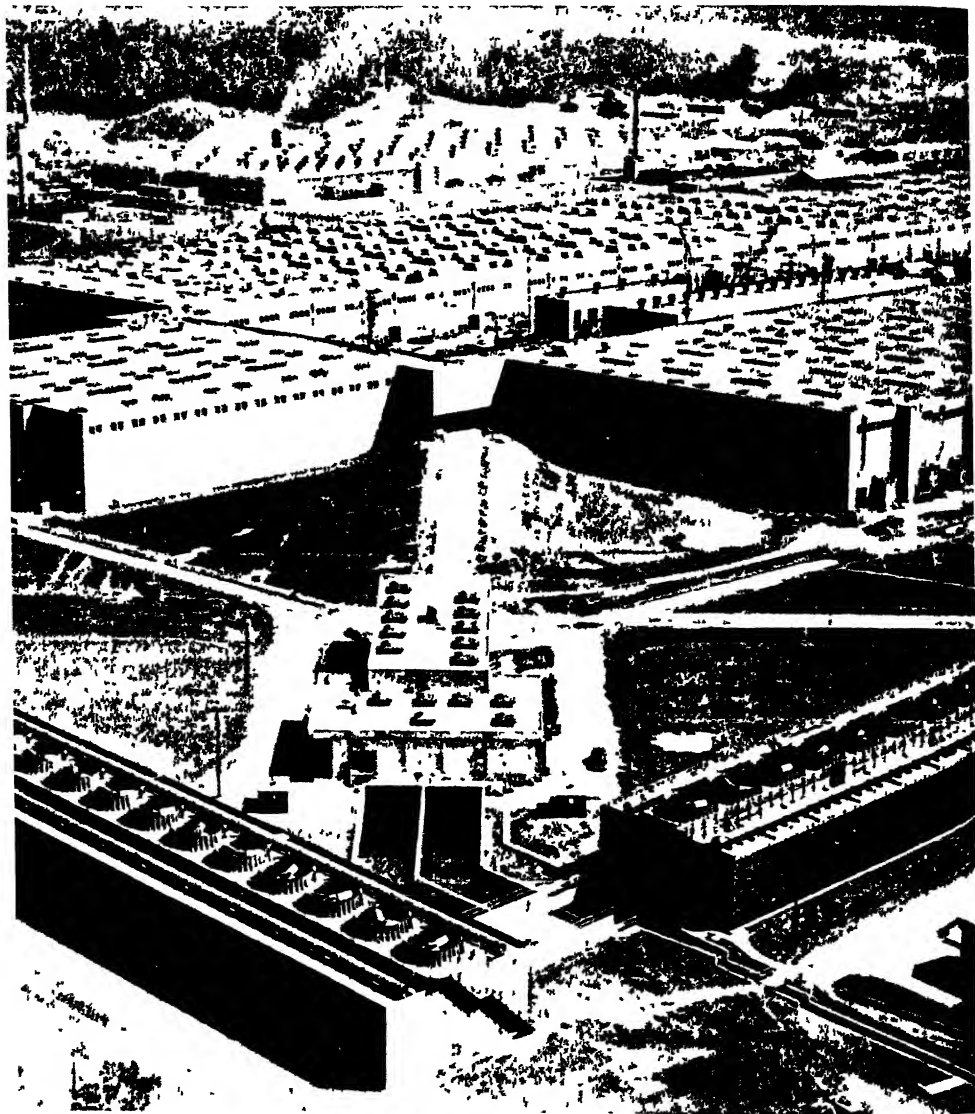
The power was in the people to make use of the power in the rivers and in the dams. As war impended and after it began TVA built dams in precise and furious haste. When victory came it controlled twenty-six major dams in the Tennessee River system: with Fontana and Kentucky in operation, it had built sixteen; it had acquired five; it was operating five owned by the Aluminum Company of America under an agreement with that corporation. These dams provided 11,000,000 acre-feet of storage as a reservoir of power and a guard against floods.

When the Japanese attacked Pearl Harbor TVA had 1,000,000 kilowatts of installed power. When the war ended it had 2,050,000 kilowatts of waterpower, plus more than 450,000 kilowatts in coal-burning steam plants. About three-fourths of this power was going to war purposes; it made TVA, in the words of the 1945 report, “the largest integrated power system” in the country; it constituted “one-tenth of the power produced for war purposes by all the public and private power systems in the United States.”

The dams stood in quietness, the power-houses almost silently sending forth their energy. The upper dams regulated the tributaries, like faucets in a wash-basin. Norris held the Clinch and Powell, Cherokee the Holston, Douglas the French Broad; Hiwassee came into being as the big brother of a nest of dams which had mastered the river of that name; Fontana was boss of the clamoring waters of the Little Tennessee.

In the main river, step by step, the dams regulated the stream

flow all the way to the Ohio: uppermost, Fort Loudon, scene of a winter-long siege of white settlers by Indians nearly two centuries ago; Watts Bar, where a huge steam plant, vibrationless, clean and almost voiceless, was built to supplement the power of the running water; Chickamauga, outside Chattanooga, by the old battlefield, the privately-built dam at Hales Bar, which TVA took over and



patched up; Guntersville, in the great Alabama bend, where the dam turned a sleepy river town into an important port; Wheeler and, just below, Wilson, the pioneer at Muscle Shoals; Pickwick, close by the Shiloh battlefield, finally, Kentucky, twenty-two miles above the junction of the Tennessee with the Ohio.

Lock by lock and pool by pool, steamers large enough for ocean



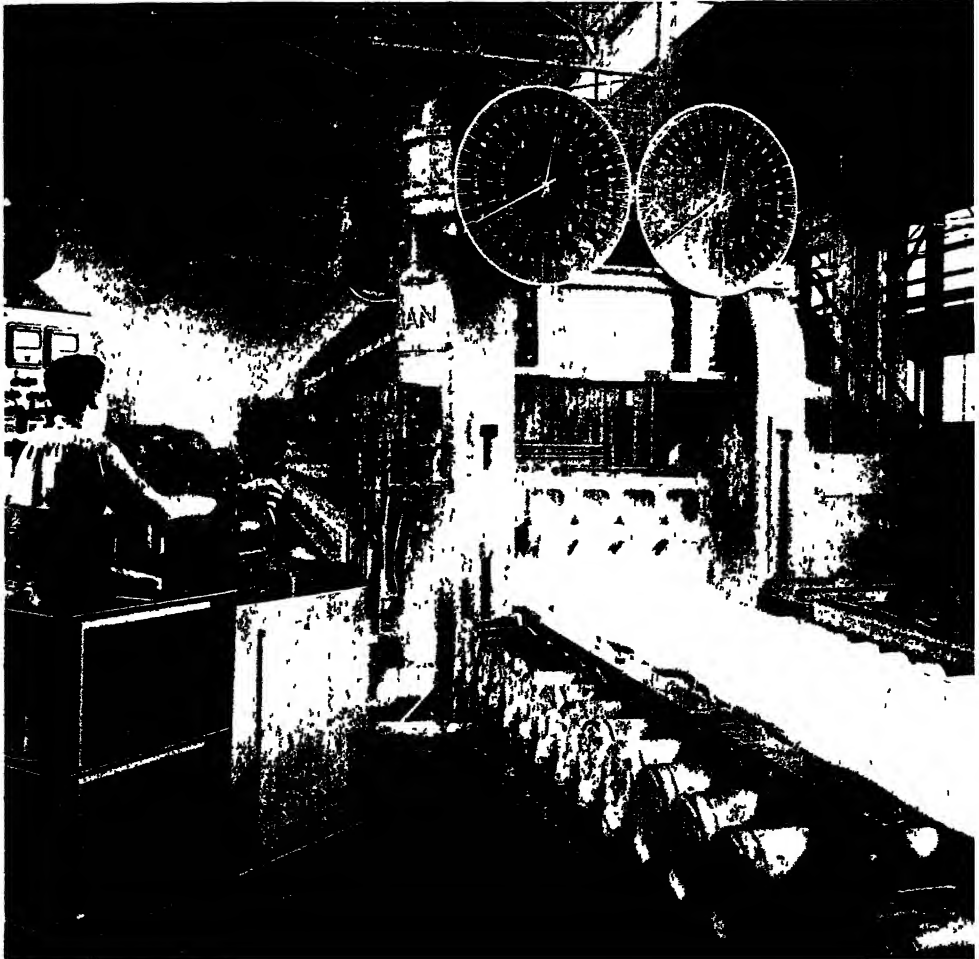
travel could go up past these dams before the war was over, and Knoxville, at the head of navigation, had become an Atlantic coast port. The TVA dams had extended our coastline by many hundreds of miles—in token of which the Coast Guard stood watch over them during hostilities. The main river had become a series of lakes, many of them spreading so widely that you lost the feeling that this was moving water, trying to get down to the sea. Away from the big towns this watery artillery, this potential explosive, was idyllic and pastoral.

But the pressure behind the dams, so quietly and beautifully accumulated, turned strident when it reached the war factories: it dissolved metals, hammered them into new shapes, rolled them with a thundering tumult, set chemical fumes sizzling and roaring; the rush and fury of falling water emerged, planned and controlled, to carry out dire purposes.

If Oak Ridge, where more power was put into smaller space than ever before in history, was quiet to an uncanny degree, this wasn't true of war industry in the Valley as a whole. There was noise enough in dealing with such raw materials as copper, feldspar, fluorite, iron, manganese, mica, phosphate and zinc; in the production of aluminum, of which the Valley furnished from thirty to forty per cent of the national output; in the processing of rayon, explosives, oxygen, hydrogen, sulphuric acid, caustic soda, methyl alcohol, acetic acid, metal dies, ferro-alloys; in the making of army uniforms, shoes, ships, fibres for tires, airplanes.

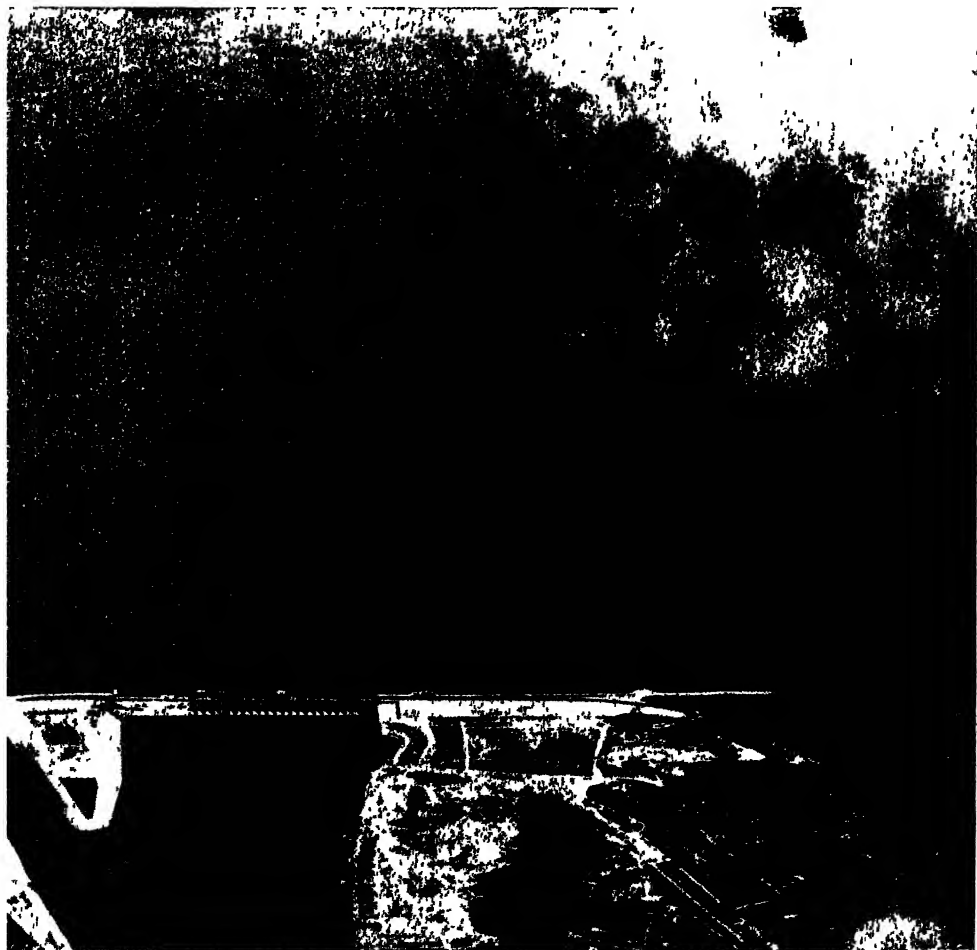
A visitor in war-time could sample what was going on here and there: a little plant at Knoxville making precise control devices, operated by temperature or by pressure, to go into jeeps, planes, tanks, warships; the tremendous mills at Alcoa and Muscle Shoals, turning aluminum dust into huge ingots, battering the ingots into sheets for airplanes, forging, hammering and shaping the skeletons

of the same planes; a boiler shop at Chattanooga, where a 6000-ton press growled over thick steel plates, shaping them like putty; a shipyard at Decatur, Alabama, where 3,000-ton Diesel cargo ships and floating machine shops were welded together and slid sideways into the river, an airplane plant at Nashville, where you could watch a bomber grow out of a multitude of aluminum sheets, plates, rods, bars and a confusion of other parts, until it came out into a flying field and was taken up for testing; an ordnance plant near Huntsville, Alabama, completed the month after Pearl Harbor and devoted to the making of smoke shells and chemical shells—the



latter never used but made ready in case the enemy wished to play that game.

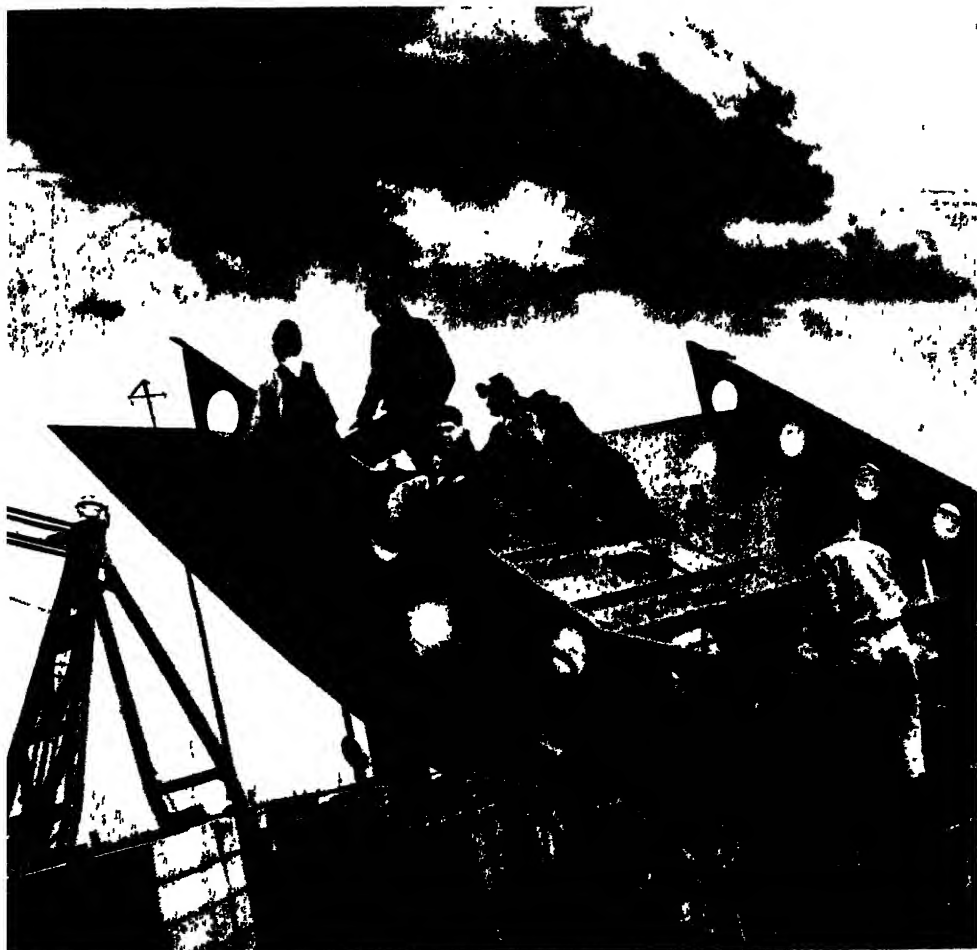
Into these factories went men and women, boys and girls, whose birthplaces were the hill and plateau farms. Where the factories were new and near-by living quarters not easily found many of them drove in from the farms and villages, twenty, thirty, even fifty miles away. Women did delicate work on small apparatus, filled gas shells, wired planes, drove trucks, handled overhead cranes. Men from all over the Valley got acquainted and compared notes. The mechanic with thirty years' experience, town-bred and sophisti-



cated, worked side by side with the man whose last job had been driving a team of mules along a lonesome hill slope.

At Muscle Shoals, during those tumultuous years, in the experimental plants maintained by TVA, you could see the future being born—a future part industrial, part agricultural. TVA had to think about war in time of peace. It had to think about peace in time of war. If most of its energies went to war those who directed them were nevertheless learning lessons that would be invaluable long after the war was over.

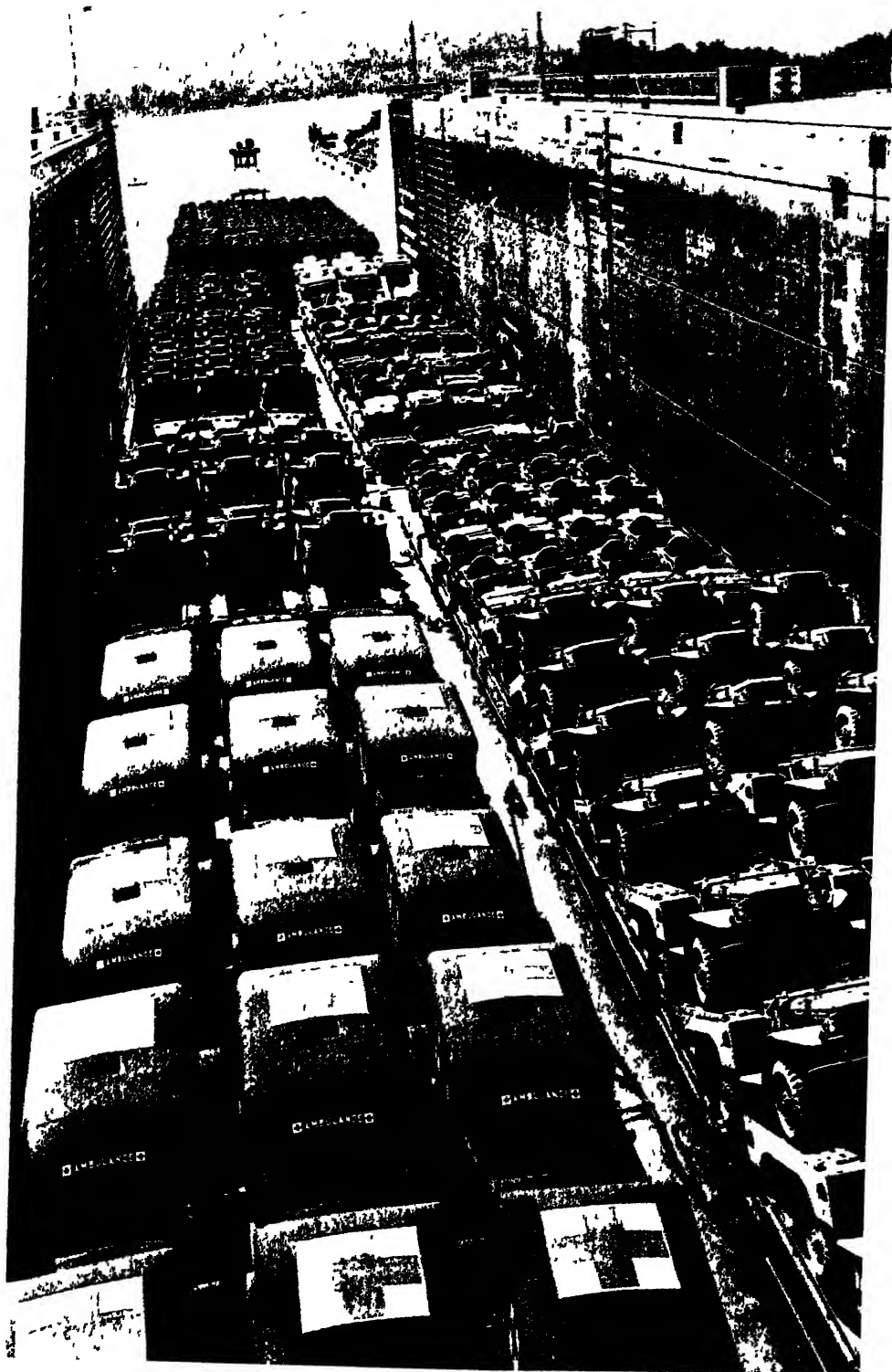
There seemed to be something symbolic in the rush of molten



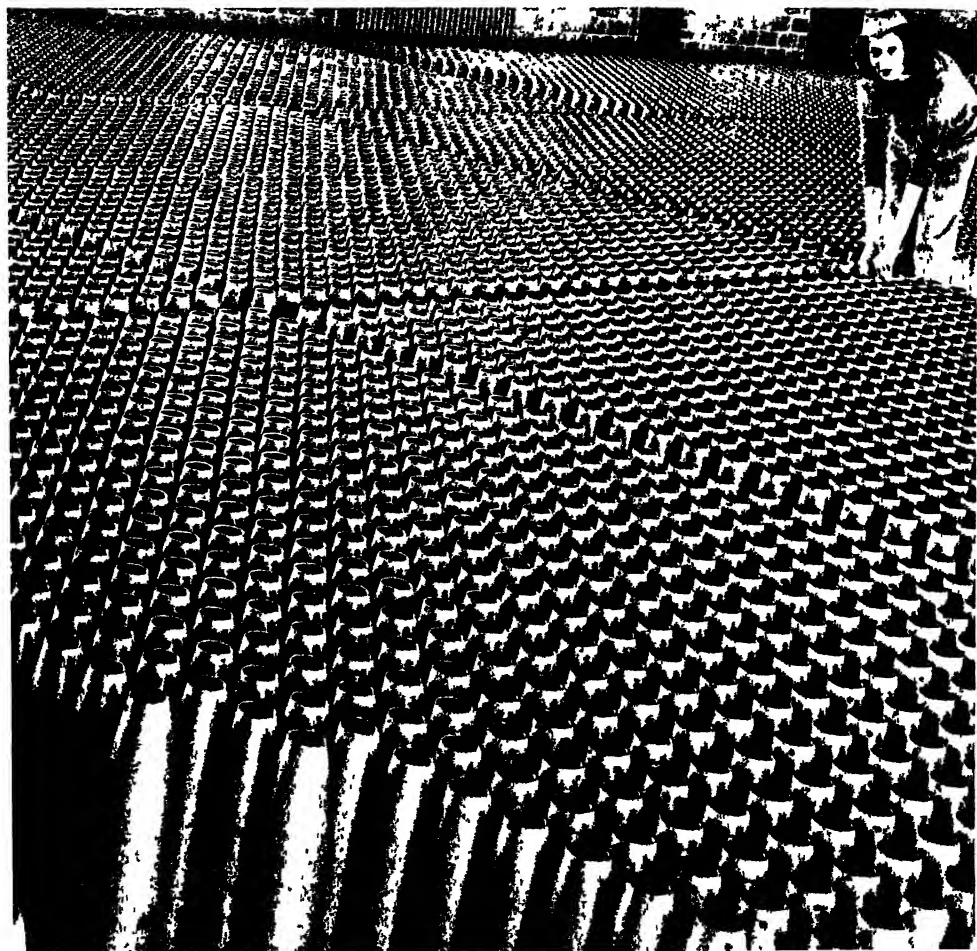
“metaphos” as a Muscle Shoals furnace was tapped; as a sort of directed hell broke loose; as steam and dust filled long cathedral-like rooms and fantastically-garbed men, protected against heat and fumes, moved like priests of a weird rite in the luminous gloom. Here were fire, destruction and damnation, but here, too, were fertility and hope.

Before the war Muscle Shoals was producing phosphate fertilizers for demonstration farms in the Valley, with an overflow sent out for trial on farms in more than a score of states outside. War brought a demand for elemental phosphorus for tracer bullets, smoke screens and other military uses; and some was sent to Britain to enrich the ancient soil there, helping to grow the food that otherwise would have taken up precious cargo space. The old nitrate plant, long disused, was regenerated to produce the basic material for modern high explosives—mild beside the atomic bomb but not innocuous, for explosives like these wrecked Berlin and Tokyo. Calcium carbide from the Shoals went into the manufacture of the synthetic rubber known as neoprene. TVA chemists at the Shoals approached success in deriving aluminum from a common clay and magnesium from a common mineral—the problem being in each case not to get them out but to get them out cheaply.

The chemical magicians at the Shoals may not have been too happy in the tasks to which war assigned them. Neither were the soldiers who trained in Tennessee for service overseas. But in using the power of the river and the resources of the Valley to destroy they also learned how to use them to save and rebuild. In a war laboratory, in a small pilot plant, might be the germ of a great peacetime industry. More men and women will come down out of the hills because of what happened here during the war. More, also, may be able to remain on farms, improve their land and stock, live happier and more productive lives.



Making its first published report since Pearl Harbor, early in 1946, TVA was able to mention several secrets besides the atomic bomb. TVA technicians, working from photographs, had made military topographic maps of half a million square miles in eleven European countries and three Asiatic countries. TVA designs for pre-fabricated houses had helped the War Department to answer a hurry call for nearly 5,000 homes for atomic energy plant employees at Oak Ridge and Pasco, Washington. Conducting experiments with the new insecticide, DDT, TVA had reduced malaria in its reservoir lands to a small fraction of its former incidence and



had helped work out techniques that saved many American soldiers from illness. Much research work was done, the full results of which could not be made public, even after V-J Day. For example, the need for incendiary bullets is, one hopes, past, but TVA chemists did some experiments in a small pilot plant on metallic phosphides that interested the Chemical Warfare Service. A "secret war project," not otherwise described, was undertaken for the Office of Strategic War Services. In short, TVA in uniform was a good soldier, though hankering like other American soldiers to get back into store clothes or—better yet—overalls.

Looking back, TVA could say that while it "mustered its entire energies and facilities to help win the war, its activities more often than not complemented the peacetime aims of river control and agricultural, forest and industrial development basic to building a stronger Valley." War had been a sort of detour around roads temporarily impassable. It hadn't been a change of direction.

Looking ahead after the fighting was over, TVA could have confidence. The first big chore, the building of dams and transmission lines, was about over, though it was expected that in the next few years TVA and its clients might build from 25,000 to 30,000 miles of rural distribution lines and add as many as 150,000 rural consumers to those using Tennessee River power. The number of employees had dropped to 12,348 two months before V-J Day, and kept coming down after that. It takes a lot of men to build a power dam but not many to operate one. The TVA of the future will not be a large direct employer. On the other hand, it will make possible an increasing amount of employment for those who buy its power. Much of this will be big-plant employment, as in the aluminum factories, but a significant amount will be in small industries processing Valley raw materials and farm products.

TVA doesn't worry over having to sell the energy which was

so swiftly developed for war purposes. It counts on reaching and passing its wartime peak within a few years. Power in the Valley is like phosphates in the soil: it makes possible a greater diversity, a more intensive cultivation and a richer yield.

Never, perhaps, will the Valley seem highly industrialized to those who give it a casual inspection. The mountains are so tall, the plains and plateaus so wide, the drowsy, lazy miles so long, that factories cannot dominate them. Always the visitor will think of fields, farms and forests first, of factories and cities afterwards.

It is just that the factories will be there if one looks for them and will be important when found. The people might subsist without them, but not well. Their output, essential in war to the national security, will be in peace a cash crop to supplement the harvest



Control room at Watts Bar Dam. Power from the great generators is obedient to

from the soil. And that harvest, too, will be reaped with the direct and indirect assistance of river-produced electricity.

One comes back to the river and the dams. Here is the key to the miracle. Look in on one of the main-river powerhouses. Let us take Chickamauga. The structure is solid, simple, right for what it has to do, saying in its clean lines an affirmative democratic thing: power in peace for the lives of people, power to enrich the mind and heart as well as the purse; power to take up again, as the 1945 Report said, the "job of building a stronger and more fertile Valley through the development of its basic resources of soil, forests and minerals"; power to go ahead again with labor-saving, comfort-yielding machinery for farm and home; power to run factories, big and little, without thought of war.

In the control room at Chickamauga two men are in charge of 90,000 kilowatts of energy. One of them is eating supper at his desk. On the switchboard is a confusion of red, green and yellow lights. An automatic indicator charts the flow of force to and fro, wherever it is needed. Does any one require slaves to turn wheels or lift loads? They arrive, at the speed of light.

Ninety thousand kilowatts! The color is dying out of the sky as we step forth. Away to the westward, always as though hurrying on an urgent errand, go the towers with their array of cables. Power marches softly, through loveliness, toward the future.

This is the Valley of the Tennessee, transformed by the movement of peoples, by vast engineering achievements, by governmental experiments, by war, by peace, by democracy. We can't understand what has happened, or what may happen, merely by looking at what is before our eyes. We have to ask how it got here, and, in some cases, why it got here.

3-

Why the Tennessee

WHY the Tennessee? Why not some other river?

In looking for answers to these two questions we come to an interesting fact. There has been controversy as to how and by whom the Tennessee should be developed. There has been no controversy worth mentioning as to whether it ought to be developed. Just to look at the Tennessee made an engineer's fingers tingle. It was there, so handy, falling from such heights, moving so fast and so far, that something had to be done about it.

The Tennessee had been linked with people's lives long before the white man showed up on its banks. It had determined the course of Indian trails and the location of Indian villages. It drew to itself the first white man's trading routes, the early white towns. Traders coming down the mountain valleys from eastern Pennsylvania and across the tall ridges from the Carolinas were bound to hit and follow the Tennessee. It is easier to float downstream with a raft or canoe than to carry a pack through the woods, as every camper knows. We hear a good deal about the famous Wilderness Road, which cut through the mountains just north of the present Tennessee state line. Throngs of people followed that hard route to get into Kentucky or to hit the Cumberland or the Ohio River. Rivers were in their minds, even when they topped

the pass and gazed silently westward over the untenanted forest. But some went down the Clinch or another tributary into the Tennessee and up the Ohio or the Cumberland, singing with the current, grunting and swearing when they had to work against it.

The first use of the river, therefore, was as a thoroughfare. The pioneer settlements were often way stations on the rivers: Knoxville, founded in 1786 as White's Fort; Nashville, on the Cumberland, near a French trading post established in the 1690's; Fort Loudoun, on the Little Tennessee, near the Big Tennessee, first stockaded in 1757; the settlements on the Watauga and Nolichucky rivers, up in the northeastern hills, just before the Revolution; Memphis, where John Overton set up his trading post in 1794; Chattanooga, junction of trade routes and war trails in Indian times, settled by white people in 1835.

It was the same with smaller towns. They were strung like beads along the watercourses, because it was convenient to be there, and often, too, the best land was there. Roads cut across from one river town to another—say, from Knoxville to Nashville, over the Cumberland Plateau. The off-river towns were where such roads crossed or divided, or, later, on the railroad lines. And some of the earliest settlers never got out of the mountains. Maybe their wagons broke down. Maybe they just liked it there.

But the rivers, big and little, pulled hard. They pulled people to their banks. They fascinated them and made them wonder. So much energy going by—what could you do with it?

There were more and more folks around to ask this question. The state of Tennessee alone had 35,691 inhabitants in 1790, at the time of the first census; 105,602 in 1800; 422,823 in 1820; 829,210 in 1840; passed the million mark in 1850, the two million mark in 1900, the three million mark, probably, as these words were being written.

The Valley and its People

And more and more of these inhabitants and those in adjoining states kept looking at the Tennessee River and thinking about it. The Muscle Shoals stretch of thirty-seven miles, with a drop of one hundred and thirty-four feet, both attracted and annoyed them. It was an obstacle to navigation, and it was more than that. Secretary of War John C. Calhoun recommended in 1824 that a survey be made for a canal around the Shoals. The state of Alabama built the canal, with seventeen locks, and opened it in 1834. It was later enlarged by the Federal Government, under an act passed in 1871.



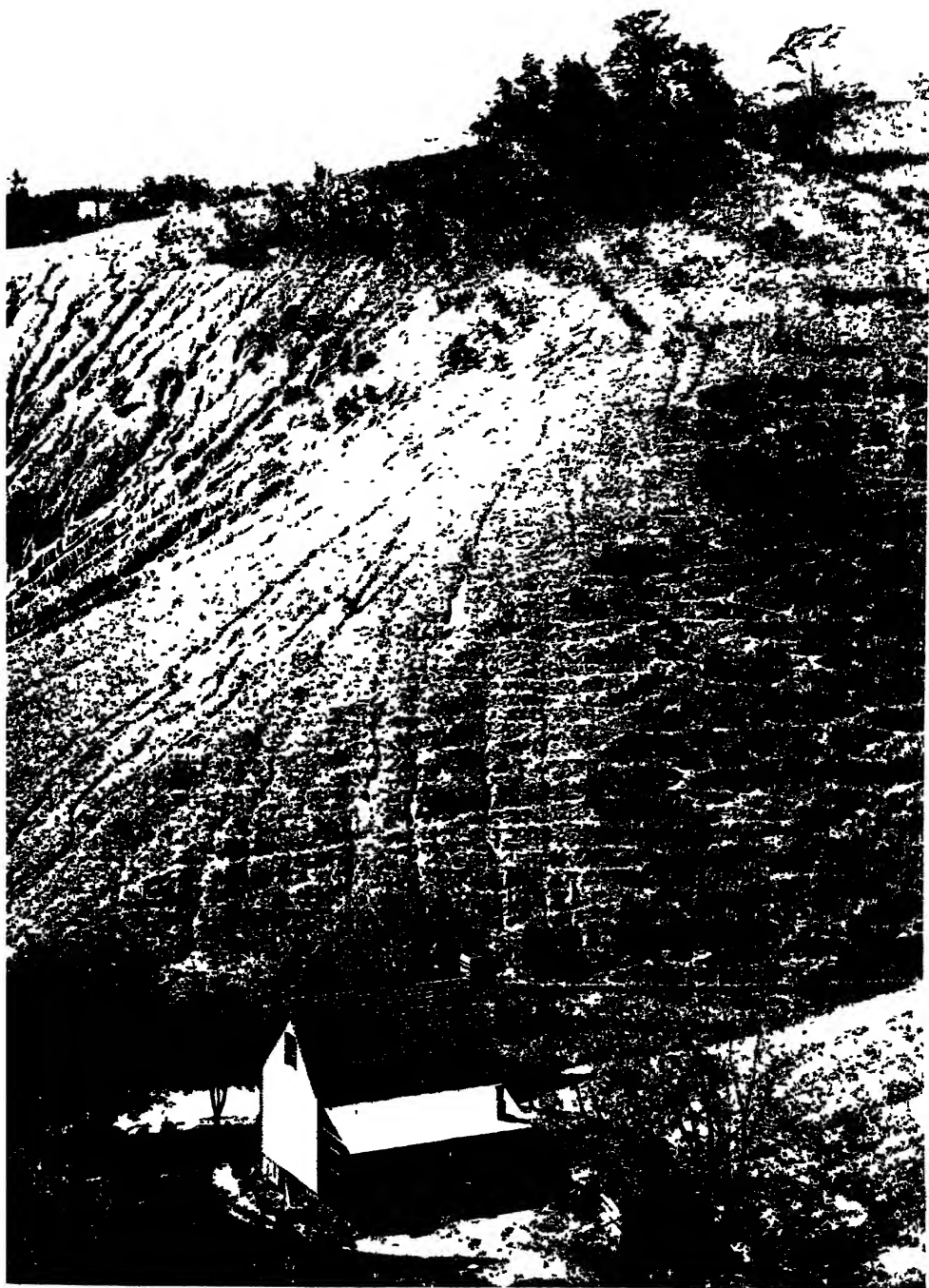
As the soil goes, so go hope and home.

Congress kept coming back to the Valley. Between 1852 and 1918 it authorized seventeen surveys or projects on the main Tennessee, ten on the tributaries. The river became well known to engineers. It was almost classic in the variety of problems it offered. Down to 1915 nearly ten million dollars (once this was quite a lot of money) had been spent in studying and improving the channel. Mostly this money was wasted. As the Army Corps of Engineers reported in 1916: "It has been impracticable to establish reliable through navigation or even an uninterrupted local navigation extending over any of the reaches."



When a section of the country no longer contributes to the Nation's welfare, it is good business to build up the income of the people.





It presents a tough job of restoration, but it can be done.



The Shoals remained, with white water in them when the river was high. The river was high whenever it had rained hard upstream, especially when the mountain snows were also melting. The water went down the Valley, sometimes doing serious harm, swelling the floods of the Ohio and the Mississippi to do more harm below. It came down yellow with mud, with soil that would never raise any more crops in the Tennessee Valley.

Yet this unruly, cantankerous stream drew the eyes of anyone who looked at a map of the eastern United States. Its valley was a link between the industrial North and the agricultural South. It had a strategic relationship with the Southern industrial outposts around Birmingham and Atlanta, just over the divide. It dipped into cotton country in the West. It delivered itself into a highly industrialized river, the Ohio—and the Ohio was in some respects an example of how not to control and use a river.

Electric power came into the picture to make it more complicated. In 1899 a company obtained a charter to build a dam and powerhouse at Muscle Shoals. The charter lapsed. In 1905 President Theodore Roosevelt vetoed a bill to give a similar privilege to another company because it seemed to him that it would benefit "private individuals of the vicinage" at the expense of the taxpayers. He had not arrived at the point where he wished the Government to make the whole investment and reap corresponding benefits, but he did think the river ought to pay its own way. In 1905 private interests made a somewhat more generous offer and were permitted to build a dam and powerhouse at Hales Bar, not far below Chattanooga. This dam had a lock, in case a barge-load of stone or something came along.

This kind of development was not satisfactory. The Tennessee, viewed as an engineering prospect, was small enough, if boldly attacked, to be handled as a whole. It was too big to be taken over

as a whole by any private organization. And people were realizing that the piecemeal attack wouldn't do. The National Waterways Commission of 1907 laid it down that "with the increasing unity of our national life and the growing necessity of securing for human needs the maximum beneficial use of the waters of every stream it will become increasingly necessary to treat every stream with all its tributaries as a unit."

The possible uses of the Tennessee River system obviously included the old one of navigation and the new one of electric power. But other elements were getting recognition. The channels



Soil-building programs alone are not enough. The standard of living must be raised by new industries.

kept silting up. Where did the silt come from? Off the land, of course. It came off because mountain slopes were being deforested and because farms were being injudiciously cultivated. The soils of the Tennessee Valley, like those of many other parts of the South, were becoming less productive. Fertilizers, as used, were not enough. Different methods of cultivation, rotation of crops, a change from the old one-crop system—all were indicated.

These problems of land and water, of river and farms, were interrelated. Try to solve one set of them and you ran into another set. And back of them all was the problem of people—good



The scene is picturesque—but a plow on a hillside is bad.

people somehow falling behind in the struggle for a satisfactory life.

In Europe in 1914 a war began, and it became more and more probable that the United States would be forced to take a hand. Modern war required large quantities of nitrates for explosives, just as soil demanded nitrates to remain productive. Chile had a supply of natural nitrates, but in time of war it might not be easy to bring them to the United States. In 1916, therefore, Congress appropriated money to build at Muscle Shoals a dam, a hydraulic powerhouse, some steam-power equipment, and two plants to derive nitrogen from the air by an electrical process already successfully used in Europe. The surveys made during so many years were bearing fruit. The engineers got them out.

Muscle Shoals did not win the war. One of the nitrate plants was a failure from the start. The other was capable of output, but it was obsolescent almost as soon as it was completed. What is now the Wilson Dam, begun in 1917, was not actually ready for operation until 1925. But it had its effect. It kept attention focused on the Tennessee.

From 1921 till 1933 the installations at the Shoals were an object of repeated inquiries, discussions, and negotiations. In 1921 Henry Ford made an offer to buy the nitrate plants, to use them for the manufacture of fertilizer, to complete the Wilson Dam and build another upstream for the Government at Government expense, and to pay off the bills over a course of one hundred years. There was something pathetic in the eagerness with which many American farmers reacted to this proposal. Their wartime prosperity had disappeared. Maybe cheap fertilizers—and they had a naïve faith that Mr. Ford's would be both cheap and good—would bring it back.

But the Ford offer, analyzed in cold blood, did not strike Congress as good enough. Senator George W. Norris of Nebraska,

chairman of the Committee on Agriculture and Forestry, had much to do with killing this and similar offers for private operation of the Shoals properties. This was Senator Norris's campaign as much as it was any man's. But he couldn't have won it all by himself. It was not that the tide of opinion in Washington during the presidencies of Harding, Coolidge, and Hoover was running against private enterprise. President Coolidge in 1928 gave a pocket veto to a bill providing for a Government corporation to make fertilizer and sell surplus power at the Shoals. In 1931 President Hoover vetoed a bill to lease the nitrate plants but let the Government produce and sell the electric power. Mr. Hoover said that this step would be "the negation of the ideals upon which our civilization has been based."

Yet President Coolidge's own Muscle Shoals Commission had stated the issue with painful candor:

It is with great reluctance that we turn toward Government operation, being well advised of all the infirmities inherent in such an undertaking. The great investment of the Government at Muscle Shoals, however, the importance of its continued maintenance as a part of our national defense, the crying need of agriculture for more and cheaper fertilizer, and the favorable opportunity for meeting the need, all compel us to disregard our prejudices, for we are convinced that to longer permit this great investment to stand idle when it can be of such great service to our people would be little less than a public calamity.

Senator Norris's committee, reporting in the last year of President Hoover's administration, was even more explicit:

In every bid which has been made it has always been discovered that the proposition had somewhere, very beautifully concealed within itself, a joker which, when exposed, clearly showed that the object of the lease was to get possession of the power facilities at Muscle Shoals, and that the lessee was using the fertilizer proposition only as a blind to gain possession for private profit of the enormous power facilities which exist at Muscle Shoals.

The Valley and its People

The voice here may have been that of Senator Norris himself. It was not his voice alone. The basic idea of TVA was coming into existence as the result of logical processes which some very conservative men would have avoided if they could—but they couldn't. TVA was to bloom under the New Deal, but it was planted under the Old Deal.

It was no political and partisan invention. It was an American invention. It was an American way of dealing with a problem for which no other suitable solution presented itself. It was as American as an old-fashioned barn-raising.

The Federal Government had intervened in the Tennessee Valley



Where Cotton Is King.

when it built the Wilson Dam and the nitrate plants. There was no other way in which to be sure of getting the desired results. The inexorable force of circumstances required it to intervene again. Three years of depression had added to the sorrows of the South, as of other sections. The intervention had to come in 1933. The particular form it took was determined by the new Roosevelt administration, but in some form it was inevitable. In those years of loss and bewilderment the Tennessee couldn't have been allowed to go undeveloped while idle men looking for work lived along its banks. It would have been like hungry people fenced off from food in a land of plenty.

The Valley had resources. It needed help if it were to benefit by them. TVA's first chairman, Dr. Arthur E. Morgan, testified:

In the fall of 1933 there were counties in the southern highlands with more than fifty per cent of the families on relief. One county had eighty-seven per cent of their families on relief. There are many prosperous communities in that region, but there is also a considerable part of that population that is on the verge of starvation. . . . This is a very desperate economic situation.

The very land was wasting. Seven million out of twenty-six million acres in the Valley were suffering from erosion. In Jefferson County, in east Tennessee, "thirty-five per cent of the land had lost more than one-half of its topsoil, 42.4 per cent had lost two-thirds or more of its topsoil and 2.9 per cent had substantially been destroyed." There was dangerous reliance on one-crop farming of corn, tobacco, or cotton, with the land left exposed between seasons. Floods were causing an average annual loss of \$1,780,000. Ninety-eight farms out of a hundred were still without electricity. Taxes were high in proportion to incomes, yet there was not enough money to support good schools, public health services, hospitals, or highways.

Power and fertility going to waste down the rivers, the most ambitious and energetic of the younger generation drifting away from the Valley—that was the picture.

The Valley wasn't sunk in hopeless gloom, to be sure. It was no hell on earth at the end of 1932 any more than it is heaven on earth now. It was lovable and loved. Farming practices had improved. Industries had come in, though some of them paid wages too low for decent living. But there was a restlessness, a sense of loss, a doubt of the future. As Stuart Chase brilliantly demonstrated regarding one Southern county, the region was in danger of insolvency: more was going out than was coming in.

One observer who visited the Valley just before TVA began



Dams and power are bringing the twentieth century to boys and girls like these.

operations thought there was then a stir of hope mixed with apprehension. People were waiting, they hardly knew what for. They had waited a long time. At the Wilson Dam two generators out of eight installed, out of at least sixteen for which there was room and power, were running. Not all the time, either. A single power company was buying the output. It didn't need it all the time. The Valley in early 1933 was like that.

What Senator Norris called a "twelve years' struggle waged on behalf of the common people against the combined forces of monopoly and human greed" ended suddenly. On April 10, 1933 President Roosevelt suggested to Congress the creation of "a Tennessee Valley Authority—a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise." By May 17 the two Houses had agreed on a bill, and on May 18 the President signed it. In the minds both of the President and of Senator Norris the act stood for a bold experiment in the public production and distribution of electric power. The President linked it with Boulder Dam on the Colorado, then three years short of completion; with the Bonneville and Grand Coulee dams on the Columbia; and with the St. Lawrence power project.

He wished each of these to "serve as a yardstick"—and by this he meant a means of comparing the cost of publicly produced power with that of power privately produced. Cheap power for all the people, in every home, on every farm, however remote, carrying with it release from arduous and unnecessary labor, civilizing wherever it went—that was the dream. The yardstick idea was destined to lose its importance. The dream survived.

The preamble of the bill omitted power in stating its purposes:

To improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper

use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of said valley; to provide for the national defense by the creation of a corporation for the operation of Government properties at and near Muscle Shoals in the State of Alabama, and for other purposes.

Electricity came into the body of the measure. The new agency was given authority to "acquire real estate for the construction of dams, reservoirs, transmission lines, power houses and other structures;" to sell its "surplus power . . . to States, counties, municipalities, corporations, partnerships or individuals," with the first three kinds of customers preferred; and to require by contract that resales be made only at "reasonable, just and fair rates." The Army engineers had been building locks for the Wheeler Dam, fifteen miles above the Wilson Dam. TVA was to complete that dam. It was to begin construction of Norris Dam. It was to use the Muscle Shoals plants "so far as may be necessary to improve, increase and cheapen the production of fertilizer and fertilizer ingredients."

To keep the program up to date the President was directed to recommend to Congress, from time to time, "such legislation as he deems proper" to carry out specified purposes: "(1) The maximum amount of flood control; (2) the maximum development of said Tennessee River for navigation purposes; (3) the maximum generation of electric power consistent with flood control and navigation; (4) the proper use of marginal lands; (5) the proper method of reforestation of all lands in said drainage basin suitable for reforestation; and (6) the economic and social well-being of the people living in said river basin."

The legislators may have paused at this point and asked themselves if they had got everything in. They went on to include not only the Valley proper but "such adjoining territory as may be related to or materially affected by the development consequent to this Act." They authorized "studies, experiments or demonstra-

tions . . . all for the general purpose of fostering an orderly and proper physical economic and social development of said areas."

It was a large order. Down to that time there had never been anything quite like it in American history.

On May 26 the President appointed Dr. Arthur E. Morgan, President of Antioch College, to be chairman of TVA. Besides being an outstanding figure in the educational world, Dr. Morgan had planned and built seventy-five water-control projects, notable among them those of the Miami Conservancy District and the Pueblo Conservancy District, both designed to prevent floods. On June 3 Mr. Roosevelt appointed as the other two members



A small farmer hasn't much chance with cotton.

Dr. Harcourt A. Morgan, President of the University of Tennessee, an agricultural specialist with an intimate knowledge of Southern people and problems; and David E. Lilienthal, who had practiced law in Chicago and then become a member of the Wisconsin Public Service Commission.

Flood-control; the land and its uses; the law and practice of public utilities: it looked as though the TVA board had them all under its three hats.

The new directors met and organized on June 16, 1933. Then they went to work.



It was hillsides like this that inspired the rumor that the corn was planted with a shotgun.

4.

The Fighting Years

SO there was a new agency called the Tennessee Valley Authority. It had a law. It had money, and the promise of more. It had a river. Because it was new it had questions to answer. It wasn't yet an institution. It was the raw material of an institution.

What did the directors, jointly and severally, want to do? Would their ideas of what ought to be done harmonize? Would the President and Congress support them? Would the state and local governments in the Valley, and the people behind the governments, support them? They had to have this support: from the Federal Government because they were its creatures; from state and local governments and from the people because no act of Congress could invade state and local rights.

Perhaps it was a mistake to use the word "Authority," for it suggested powers that TVA never had and could not have. It had just one positive coercive power, long exercised by a variety of public agencies: it could acquire property from unwilling sellers by process of condemnation. Any city desiring to establish a public park could do the same thing. Beyond this, TVA had, or was to have, the power possessed by any agency, public or private, which has a natural monopoly—in this case, a monopoly of electricity in

specified areas. This power was not, and never could be, absolute. Congress could withdraw it at any time.

In the long run, and even in the short run, TVA could do little except by consent—and not merely the consent of Congress, representing all the people of the United States, but consent of the people in the area who were directly affected. It could have the noblest dreams for “the economic and social well-being of the people living in said river basin,” but the dreams would come to nothing unless the people were themselves persuaded that what was being done and proposed was good.

These facts were self-evident. But it took TVA more than five years: first, to obtain a judicial interpretation of its rights and powers, so that it could confidently make and carry out large-scale, long-range plans; second, to bring peace to its own household. The Board had hardly pushed its chairs back after the first meeting before the sounds of battle began: private enterprise was attacking its foundations in law and Chairman Arthur E. Morgan was opening a war of doctrines, policies, and personalities against his two fellow directors.

In spite of these handicaps the first half decade was a period of tremendous achievement, in which Chairman Morgan played a distinguished role. Neither then nor later did any shadow of scandal or corruption touch TVA.

The building, experimenting, and demonstrating went on, as we shall see in later pages, through all the fighting years, in passionate sincerity and with a spirit of workmanship to which every dam, powerhouse, transmission line, and TVA installation in the Valley testifies—and a great many intangible achievements besides.

The travail in men's minds and souls is as real as a river flowing, as real as flood water going downstream in spring. It is a part of the democratic process. A legal principle may stand as long as a



At the age of five cotton picking is not a back-breaking job.

dam—it may even be as beautiful. And the personal grievances and disappointments will be forgotten.

One may not wish to tell the story, but it has to be told.

Some people waited eagerly for TVA to do the wrong thing. It had been directed to maintain “its principal office in the vicinity of Muscle Shoals, Alabama.” It met this requirement in form, but in fact it found Knoxville, Tennessee, a more convenient spot from which to direct most of its vast dam-construction activities. This was a small grievance that still rankles in the minds of a few citizens, including some who hopefully offered land for sale at or near the Shoals. Few others cared one way or the other. The critics had to wait for bigger game.

Sluggishness was one fault of which they couldn’t accuse TVA. The first annual report, appearing in 1934, was an amazing record of achievement. The Norris Dam, begun in October 1933, was about one-fourth completed by July 1, 1934. The Wheeler Dam, begun in November 1933, was scheduled for completion in 1936.

TVA was building transmission lines, the principal one connecting the Norris, Wheeler, and Wilson dams. It was stringing rural lines in northern Alabama and northeastern Mississippi. It was furnishing current to three municipalities—Tupelo, Mississippi, and Athens and Muscle Shoals, Alabama; to a non-profit association taking in Alcorn County and the city of Corinth, Mississippi; and directly to a power district in Mississippi. It had options on properties of the Commonwealth and Southern Corporation and its subsidiaries in Alabama, Georgia, and Tennessee.

It had adopted a power policy under which it announced its purpose to “serve certain definite regions,” whether or not this step “would injure a privately owned utility.” These areas were those it could most easily get at: around Norris Dam, around Muscle Shoals, and along the transmission line between these two

points. TVA was going to be tough if necessary. One had to be tough in the electricity business.

TVA was studying the use of electricity on farms, with a view to giving service there. It didn't see why a twentieth-century farmer should have to live and work in the nineteenth century. It was buying up phosphate reserves and it was building furnaces at the Shoals for "the production of phosphate fertilizer materials on a small but commercially practicable scale."

It was making maps, collecting data on stream flow and silting, examining dam sites, prospecting for construction materials, co-operating with the Forest Service and CCC in studying and conserving timber resources, joining with state and Federal agencies in an erosion-control program.

It had increased its payroll from 45 persons at the end of June 1933 to 9,173 at the end of June 1934, and had set up an organization to handle this large and growing army of workers. It had established a labor policy which was to keep it on good terms with the unions. Exempt from the civil service laws, it hired and fired on a basis of merit. Chairman Morgan told the politicians that there would be no political jobs, and there were none. The politicians didn't like it. They still don't.

The first report called for "a single unified plan for the development of the entire Tennessee River system for navigation, flood control and power development," which it was held would "result in very great economies and prevention of waste as compared with separate uncoordinated developments."

What was launched during that first year went ahead, with some modifications and some interruptions. The modifications were the result of experience. The interruptions were deliberate, and intended to be lethal. Private power companies were aroused, as was only natural, by what they considered an invasion of their

territory and their rights. During the first five years of its existence TVA's constitutional authority was questioned in 57 cases and its operations were impeded by 26 injunctions, of which all but one were later dissolved.

No one could say that TVA's opponents didn't have a right to bring their case to court and to argue it before the public. There was an issue concerning which honest men could disagree and these were the democratic ways to settle it.

But not all the fighting was fair. There were misrepresentations.



It was not so much the people as the land that needed help.

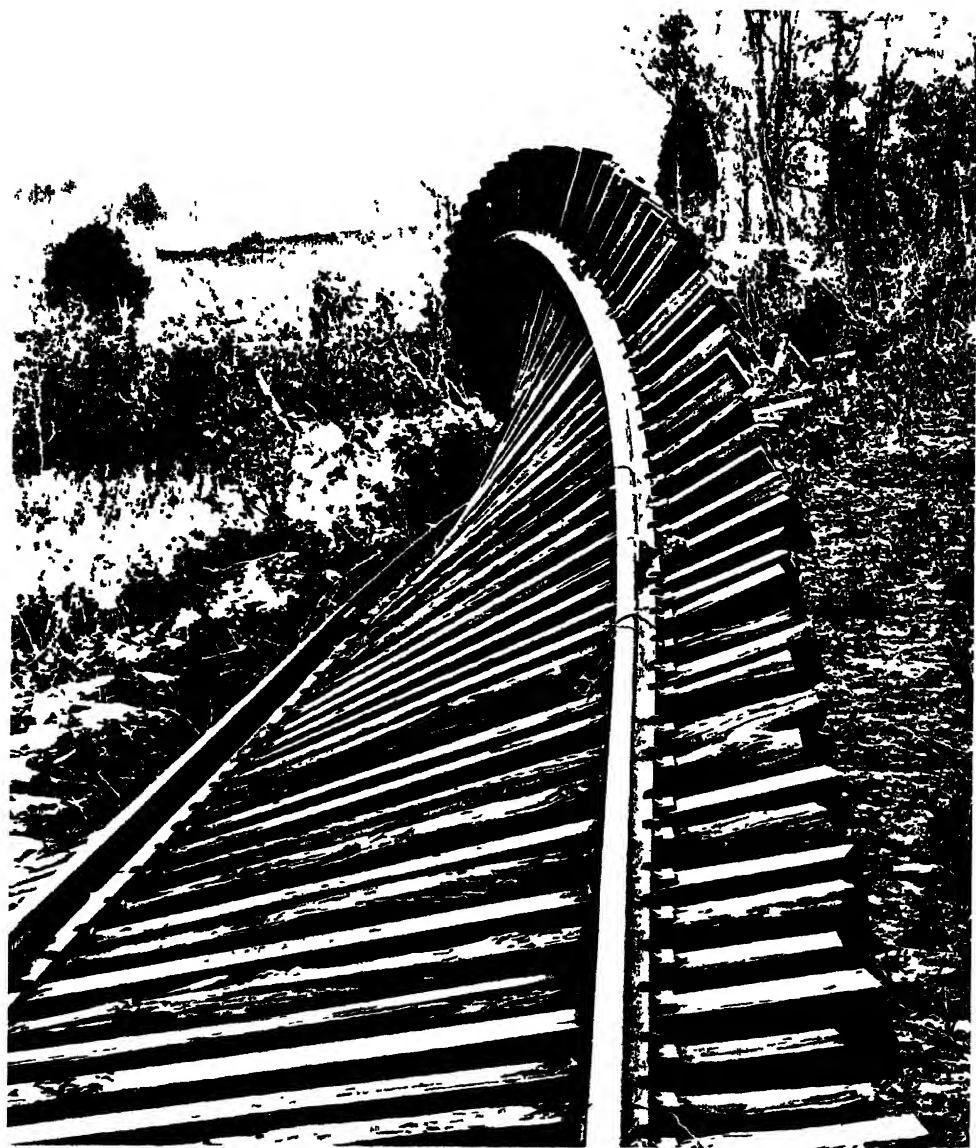
It was said, for example, that TVA was using the taxpayers' money to produce electricity at costs that the private companies couldn't meet. As a matter of fact, TVA's wholesale rates—what it actually got for its electricity—were not much, if any, below the prevailing level. The private companies could meet them. The radical cuts in price were retail cuts, determining the rates at which communities and co-operatives resold to their citizens or members the current they bought from TVA. TVA wanted these retail rates brought down as low as possible, and so stipulated in its contracts. But it didn't benefit from them, except as low rates made for wider use, and wider use helps anyone with goods to sell.

It was also asserted that TVA could undersell because it didn't have to pay taxes. It did pay sums in lieu of taxes, these sums being percentages of gross proceeds from the sale of power, duly prescribed in the TVA Act. In 1938 taxes or sums in lieu of taxes paid by TVA and its municipal or co-operative customers were just about equal to what private companies paid. (By 1943 they were considerably greater than what the private companies had paid.)

The utilities carried on a lively campaign. The Donahey Congressional Committee, reporting in 1938, made these comments:

Utility activities directed against the marketing of the Authority power to municipalities were particularly evident at Chattanooga. The Commonwealth and Southern Corporation furnished \$20,000 to a local citizens' and taxpayers' association for use in a campaign preceding a referendum on the construction of a municipal distribution plant. The Tennessee Electric Co., a Commonwealth and Southern subsidiary, used its salesmen to canvass votes in the referendum, lent employees to the citizens' and taxpayers' association, and assisted financially a Chattanooga newspaper which editorially opposed public power. Other utility activities designed to block the Authority's power program have included the dissemination of propaganda, much of it containing statements of a misleading character.

The truth was that TVA disturbed the power business in its area, and by example in adjoining areas, by its very existence. No misleading propaganda, no hurried placing of private lines by night in a vain effort to forestall TVA extensions, no sudden rush of generosity toward the hitherto neglected rural customer, no



The force of the flood that twisted these rails is now electric power.

legal argument was needed to establish this fact. The theory behind the TVA power program was that electricity should be more widely used, and that the way to get it more widely used was to force retail rates down. Henry Ford and others had proved the point in industry. Power companies in general were more conservative. Many of them limited their own business by sheer lack of enterprise.

When some of the Commonwealth and Southern subsidiaries, under the intelligent direction of Mr. Wendell Willkie (who learned fast in this field as he did later in other fields), cut retail rates and went after new business, they earned more than they had before.

The ability to cut rates was not a Government monopoly. Anyone could do it. But TVA did have to have a monopoly of supply in its chosen areas. It was a standing challenge. The best legal minds in the private field were summoned to battle. Nothing that imaginative and gifted lawyers could find to say against TVA was left unsaid in the suits that were filed against it. In the words of Circuit Judge Florence E. Allen, referring to the complaint in equity brought by the Tennessee Electric Power Company and eighteen other utilities:

The bill cannot be summarized within the appropriate limits for a trial court's opinion. In addition to its seventy pages of pleading and sixty-five pages of exhibits it contains within the bill itself much that is argumentative, repetitious and immaterial to the legal questions presented. It charges coercion, fraud and conspiracy on the part of the defendants officially and individually.

And so on.

But in reality only two questions were presented: first, were the policies and actions of TVA within the scope of the Tennessee Valley Act; second, was the act itself constitutional?

In what is generally known as the Ashwander case, because

Mr. Ashwander came first in an alphabetical list of petitioners, the Supreme Court of the United States, on February 17, 1936, held that "the Wilson Dam and its power plant must be taken to have been constructed in the exercise of the constitutional functions of the Federal Government," that TVA had a right to sell surplus power from this dam; and that it had a right to build a transmission line in order to reach a wider market, since at the dam itself the market appeared to be "limited to one purchaser, the Alabama Power Company and its affiliated interests."

Chief Justice Hughes wrote this opinion. In a homely figure he added: "We suppose that in the early days of mining in the West, if the Government had undertaken to operate a silver mine on its domain, it could have acquired the mules or horses and equipment to carry its silver to market."

This decision did not settle the question of TVA's right to build power plants at other dams and acquire the necessary "mules or horses and equipment" to carry power from those plants also to market. This point received what turned out to be final attention at the hands of Circuit Judge Florence E. Allen and District Judges Gore and Martin in the Northern Division of the Eastern District of Tennessee on January 21, 1938.

Judge Allen's opinion is one of those rare judicial marvels of clear statement which the most literal-minded layman can understand without a translator. The complainants sought "to enjoin the further construction of TVA dams now in process of construction in the Tennessee Valley, the construction of new dams in such valley for which specific appropriation has been made by Congress and the operation for generation and sale of electric power of all TVA dams built and to be built." Had this injunction been sustained, what was left of TVA could easily have been swept up with a whisk-broom.

The court sat for seven weeks and examined 1,100 exhibits. Judge Allen's opinion covers a bare 27 printed pages. It found no evidence of "coercion, conspiracy, malice or fraud." It found "overwhelming" proof that "the mandatory provisions of the statute that navigation and flood control be given primary consideration, both at the other dams, built and planned, and at Norris Dam, is at all times scrupulously followed, and that the statute is neither violated nor exceeded." Finally, it held that the TVA Act was an exercise of the constitutional powers of Congress, that its

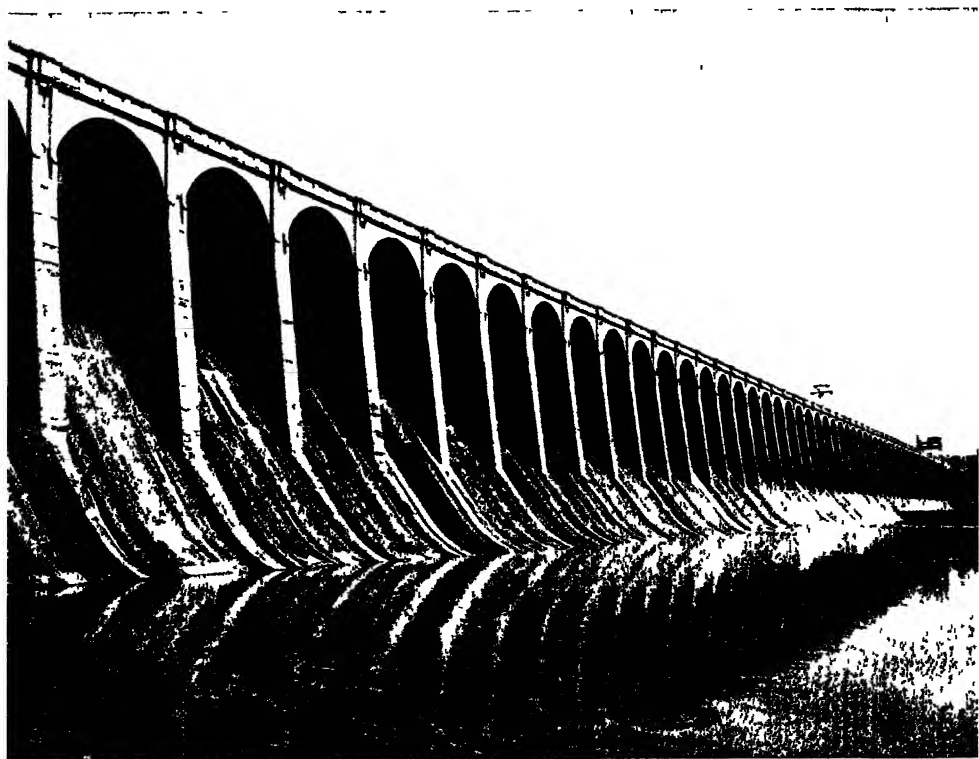


Summer on the old Tennessee River. Deep channels have now brought modern Diesel tows.

objectives were legitimate, that the high dams and powerhouses were "an appropriate means to accomplish these legitimate ends," and that there was no invasion of the rights of the states. The complaining power companies were told that they had "no immunity from lawful competition, even if their business be curtailed or destroyed," and their suit was dismissed.

Fourteen of the petitioners carried the case to the Supreme Court, which decided on January 30, 1939 that they had suffered no grievances which entitled them to bring suit. The form of this decision did not admit a ruling on the question of constitutionality, but the Supreme Court's approval of the lower court's procedure was manifest.

If the utility companies couldn't challenge TVA in the courts, who could? As a practical matter TVA had to be considered



Wilson Dam. Public power won a battle here.

henceforth a constitutional agency acting within a constitutional statute. Within seven months of the Supreme Court decision the properties of the Tennessee Electric Power Company were sold to TVA and to the communities which they served, for a total price of \$78,600,000. Mr. Willkie, taking this check from Mr. Lilienthal, said that this was quite a lot of money for two Indiana farm boys to be handing around. Now that the battle was over, everyone was good-natured. This and other purchases ended the period of struggle between TVA and the utilities in its area.

Meanwhile TVA had its own household war to deal with. A great part of the controversy between Chairman Arthur E. Morgan on the one side and Directors David E. Lilienthal and Harcourt A. Morgan may as well be forgotten. A writer who talked with Dr. Arthur A. Morgan on several occasions, and who was impressed by his almost passionate sincerity, takes no joy in discussing his errors.

Dr. Morgan was two men: he was a hydraulic engineer whose structures will outlive the sons, and sons' sons, of those alike who praise him and who blame him; he was fanatically honest to the last penny and the humblest job under his control; and he was also a dreamer, thinking in terms of little industries, of new kinds of communities, of the changing lives of people. He was impatient. He had confidence in his own judgment, perhaps in his own intuition. He could not adapt himself to the conditions existing on the TVA Board, where, though he was chairman, the other two members could outvote him. This situation was bound to lead to trouble, and it did.

To take an outstanding instance: George L. Berry of Tennessee, labor leader, New Dealer, and later United States Senator, had acquired an interest in some marble deposits on the Norris reservoir site and, when it became known to others besides Mr. Berry that

the marble would be under water, had put in a claim for reimbursement on a generous scale. Directors Lilienthal and H. A. Morgan proposed to submit the question of whether or not the marble had any commercial value to a preliminary determination by one of the leading experts in the country, Mr. John W. Finch of the United States Geological Survey. No one was to be bound by Mr. Finch's findings, but it was hoped that if he reported that the marble had no value Mr. Berry would accept this disinterested verdict and that expensive and tedious litigation would be avoided. Dr. Arthur E. Morgan said this proposal was dishonest.

This was the detonating point. Chairman Morgan made other charges which aroused both the hopeful enemies and the anxious friends of TVA. He had feared that his associates, in their anxiety to bring in cash returns, were over-emphasizing the production and sale of power; he accused the TVA legal staff in the Tennessee Electric Power Company suit of asking TVA engineers to "give testimony of a misleading character;" he wrote a magazine article in which he gave comfort to TVA's opponents by declaring that "in the operation of public 'yardstick' systems there should be no hidden subsidies, no undisclosed government assistance to local public power systems;" he declared that "no impartial technical appraisal and report of the fertilizer program ever has been made to the board or to the public;" he released to the newspapers a letter in which he accused Director Lilienthal of "hard-boiled, selfish intrigue."

A show-down was imperative. On March 11, 1938 President Roosevelt called the three directors before him, although it required three increasingly stern telegrams to bring Chairman Morgan to the White House. Once there, he demanded a Congressional investigation, refused to answer the President's questions, refused to withdraw his charges, and refused to resign. It was plain that the

TVA Board could not continue as constituted. Either Chairman Morgan or Directors H. A. Morgan and Lilienthal had to go. Mr. Roosevelt removed Chairman Morgan, as of March 23, 1938.

A joint Congressional committee, under the chairmanship of Senator A. V. Donahey of Ohio, next entered the picture. A future United States Attorney General, Francis Biddle, was named committee counsel. He accumulated 6,200 pages of testimony. But it all boiled down to very little, except as a drama of personalities.

It turned out that although Chairman Morgan meant to accuse his fellow directors of intellectual obliquity he did not mean to say that they had "taken bribes or stolen money." No evidence was found that anyone else connected with TVA had done so.



Dams are not solid masses. Monoliths of concrete are poured side by side in Norris Dam. Numerous inspection tunnels run from top to bottom and from end to end.



In the first cofferdam at Watts Bar concrete is laid on the bed rock of the river.

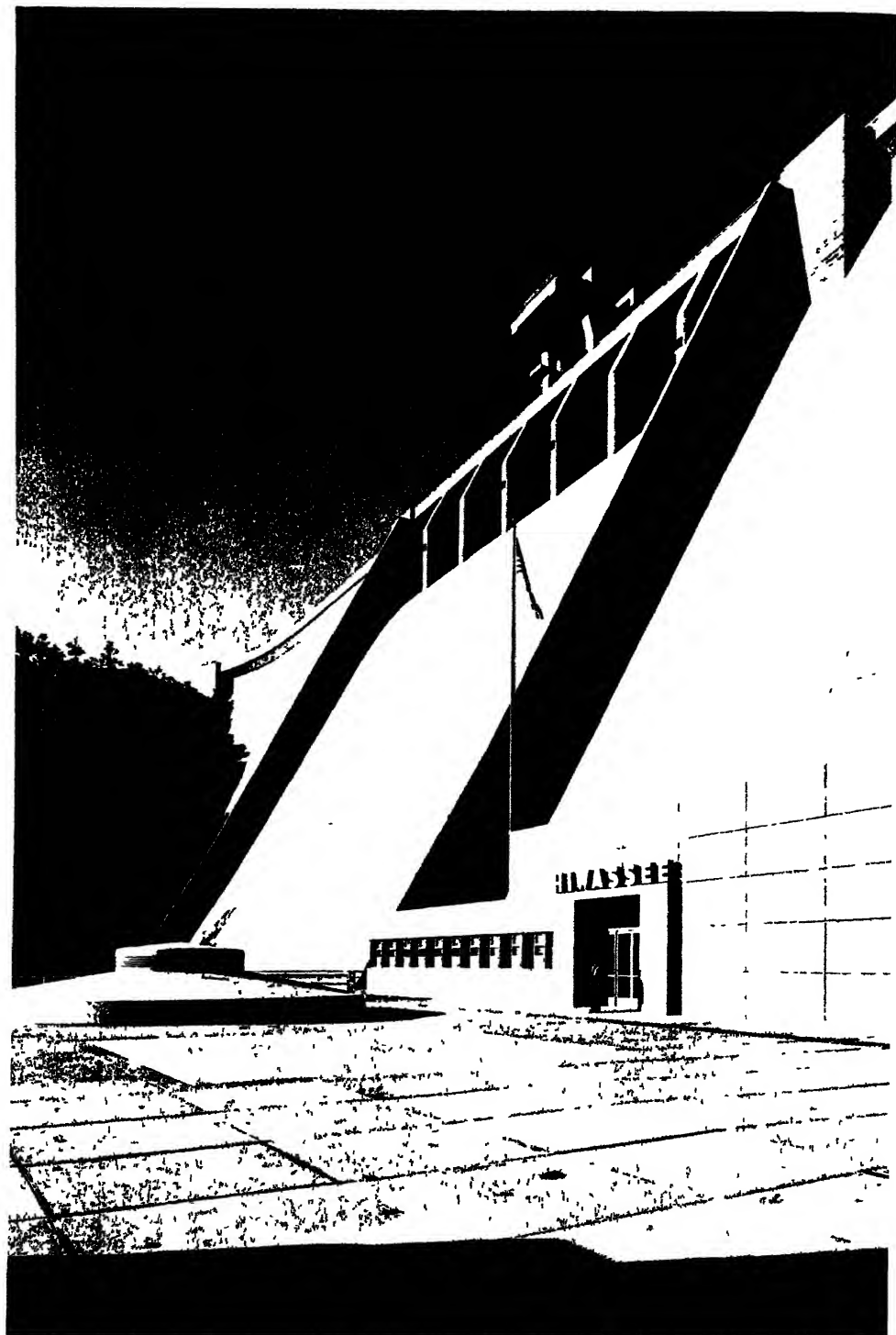


*The water will be over 400 feet deep in the reservoir behind Fontana Dam.
The tree line will be the water line.*

The Committee criticized some phases of TVA's early procedure. It found that during the first year "the acquisition of land was slow and poorly organized, and there was too much tendency to 'trade.'" It thought the policy of non-discrimination against Negroes, admirable on paper, had not been "enforced as fully as could be desired." It described the accounting system, prior to 1938, as "extremely unsatisfactory." But it endorsed the power policy, including the rates. It had good words for the fertilizer policy. In short, it concluded that "the main purposes of the Tennessee Valley Authority Act have been honestly and efficiently performed by the Authority."

It praised Dr. Arthur E. Morgan "for the excellent engineering work done by the Authority, for its enlightened labor policy and for certain other progressive aspects of its work." It held him chiefly at fault for "personal disagreements with the other board members," which had "led to serious internal stresses in the organization that hampered its effectiveness." Unwilling to accept his presidential dismissal, Dr. Morgan carried his case to the Supreme Court, where his petition for a writ of certiorari was denied. Former Senator James P. Pope of Idaho was named by President Roosevelt to fill the vacant place on the Board. Dr. Harcourt A. Morgan served as chairman until 1941, when, by his own request, he resumed his original position as board member, passing on the chairmanship to Mr. Lilienthal.

Thus by early 1939 the fireworks were over. TVA became what the Donahey Committee thought it should be—"a settled and established institution in the Valley."



Concrete and Steel

"We wanted those dams to have the honest beauty of a fine tool, for TVA was a tool to do a job for men in a democracy."

DAVID E. LILIENTHAL

IN something more than a decade TVA built sixteen dams. It began at a fairly leisurely pace. At the end it was moving with astounding speed, like an army getting ready for imminent battle—which it was. It finished the Cherokee Dam in the month of Pearl Harbor: sixteen months, and a world record. Then it did Cherokee's near-twin, Douglas, in twelve months.

The building of these dams was spectacular—so much so that TVA people sometimes feared that TVA would be thought of as nothing but dams. At the end of the first year visitors at Wilson Dam and at the Wheeler and Norris sites were coming at the rate of a thousand a day. They kept on coming, all up and down the Valley, riding in cars with the names of every state in the Union on their plates.

Guides were there to escort them in those days, through impressive lobbies adorned with maps and photographs, around above the generators, so quiet in the immensity of the great halls that

held them, so small, almost. They could drive across the tops of some of the dams. They could look at the calm pools above the dam, the whirling water below.

It was a great show. The show is still there, though in time of war the curtain had to be rung down and the actors went about their business behind dimmed footlights.

This building of dams and powerhouses, this setting up of transmission lines, with towers that looked like giant models of dress-makers' dummies, this orderly fury of construction, was one of the most marvelous spectacles of its kind that have been seen in this generation on this or any continent.

It was in part a simple triumph of planner, designer, and engineer, of an art and science which has been brought near to perfection in twentieth-century America. In a way it would not have mattered who the employer was. The dams would have looked the same if they had been built by private contract for a private corporation which would presently hold the fate of the Valley and all its people in the hollow of its hand. It wasn't merely an agency created by act of Congress that was at work here. It was the genius of a nation.

But this genius was being expressed in new forms, here in the Valley. For one observer, who saw the task going forward at intervals over a decade, it came in time to have the thrill of the march of an army with banners—and more than that. It was like seeing the pioneers cutting down trees in New England and Ohio. It was like watching the first plows moving across the unbroken land of Kansas. It was like coming on the first wagons moving over the South Pass. It was like history. It was like epic poetry. It was like music.

You read the letters "U. S." on the great trucks and bulldozers. You saw the faces of men on the job, the engineers in their offices

or walking the dams, the weather-beaten faces of drivers, drillers, steel erectors, the eager faces of men guiding and receiving the great buckets of concrete. It was like victory. You wanted to take off your hat. You forgot about injunctions and court decisions, about quarrels and controversies.

To the layman there is no engineering enterprise that seems at the start so confused, so hopeless, so cluttered as this building of a dam. He who sees a great many dams in process will still wonder at this miracle.



First blast in the quarry at Cherokee Dam. Two days before Pearl Harbor this rock was concrete in the finished structure.



The confusion is an illusion. The powerhouse generator stalls and draft tubes are under construction.

He will remember driving through the mud to get to the Gunter'sville site when the first cofferdam was beginning to take shape. How could form come out of that chaos?

He will remember the shovels wrestling with the earth down in the cofferdam at Pickwick. What would happen if the rising river topped the dam? We'd have warning, says the engineer; we'd take them out in time. If the coffer washed out—we'd build it again.

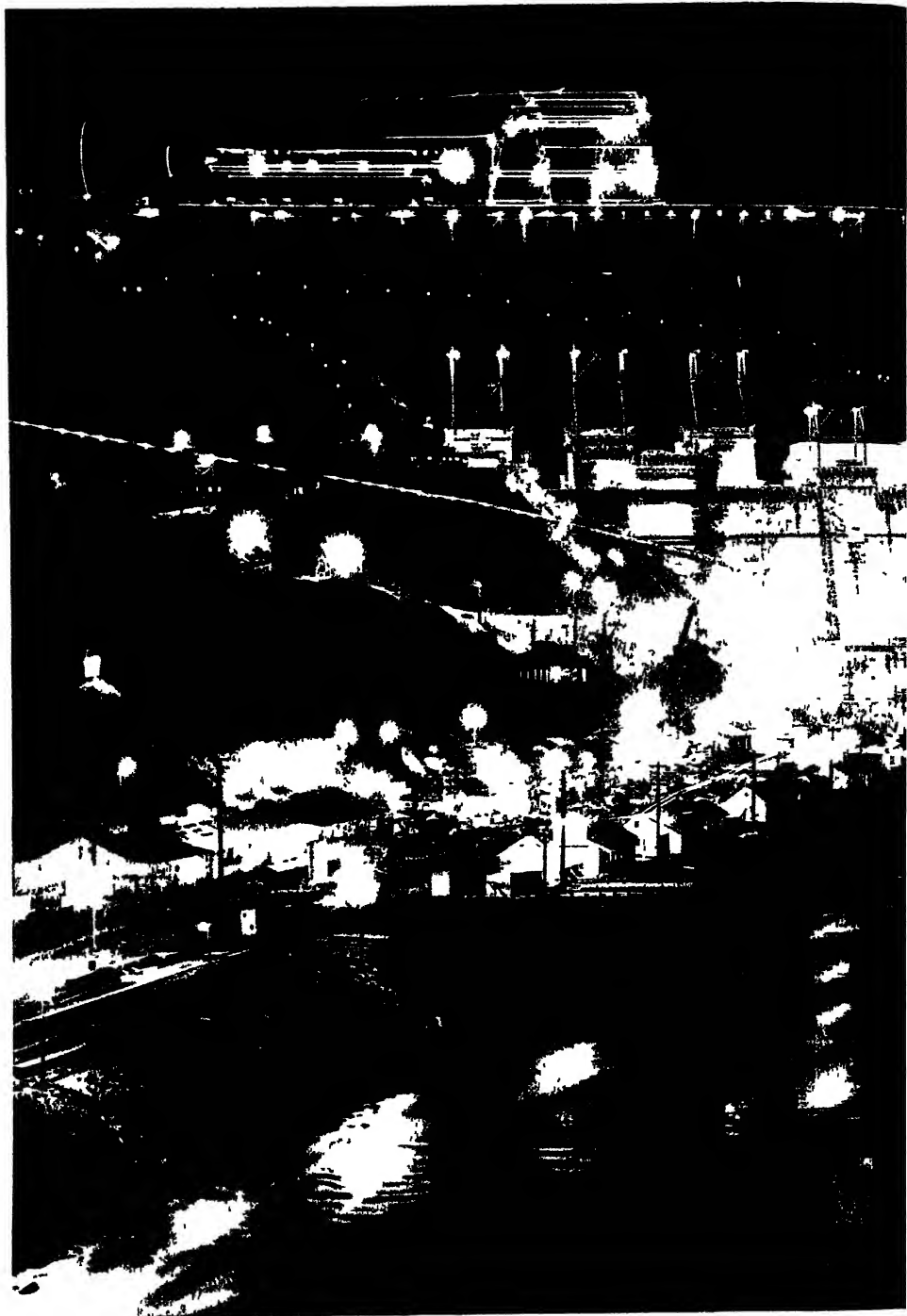
He will remember the littered landscape at Chickamauga, and how his guide seemed to see as plainly as though it were there each form and angle of the completed structure; and how he came back, and they were there.

He will remember the man cutting hay in what was soon to be the bottom of the Cherokee reservoir, and how the little farm and the house among the trees seemed as though they were to be there forever—but they weren't.

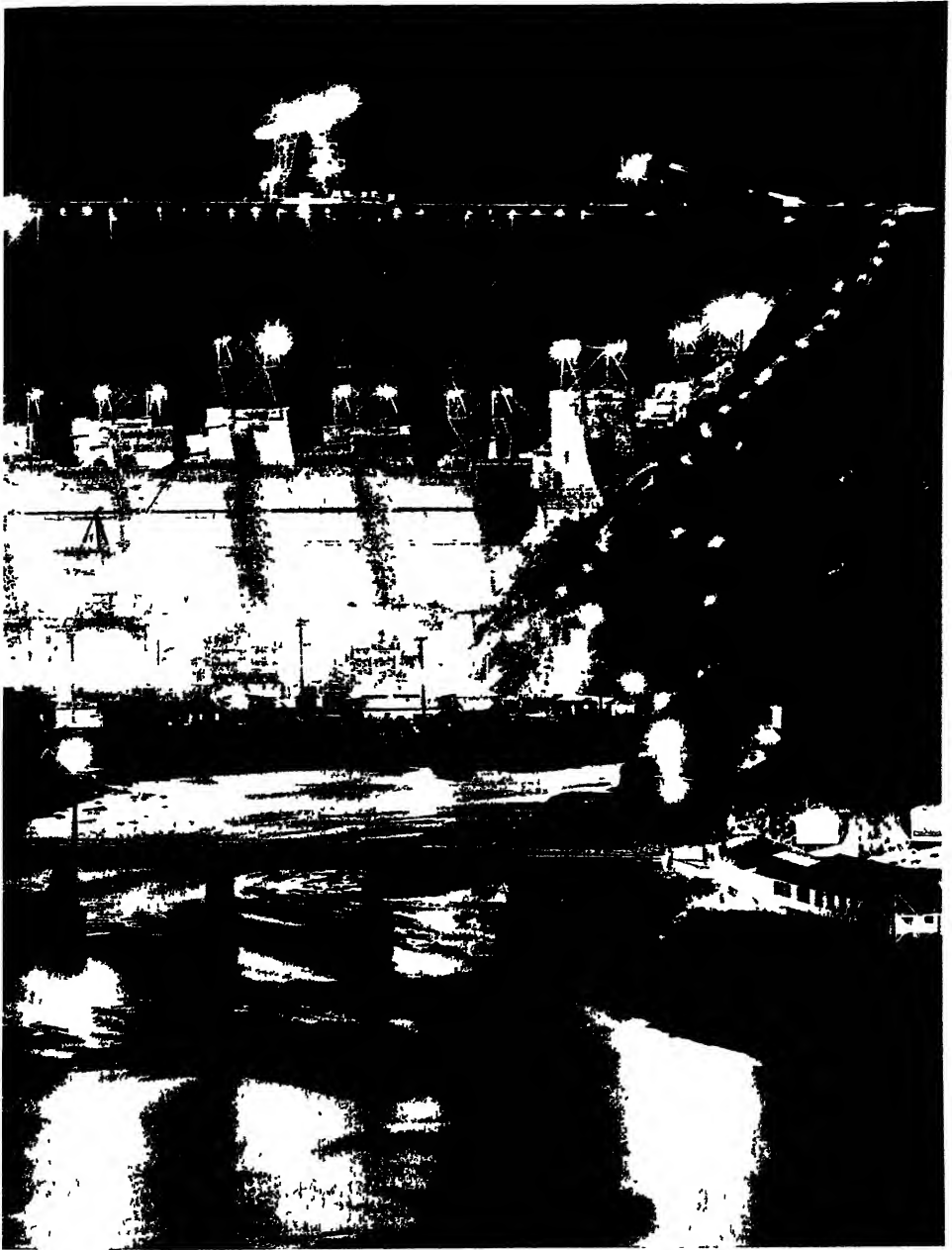
He will remember the awesome tunnels and scraped cliffs at Fontana, and how impossible it was that a river in this setting could ever be controlled—but it was destined to be, and the engineers never had the least doubt about it.

It was never just one dam that was being built, any more than it is ever just one battle that is being fought in a war. It was all the dams, each related to the others. It was a whole river system that was being brought under control. As the engineers liked to say, it was an assembly line of dams.

It was literally such. No two dams were precisely alike, for no two sites could be identical, but the same research, planning, and construction staffs, in many cases the same skilled workers, and very often the same machinery could be used on a series of dams—provided, of course, that they were timed for this purpose. Thus TVA, because of the size of its job, achieved the economies of large-scale production.

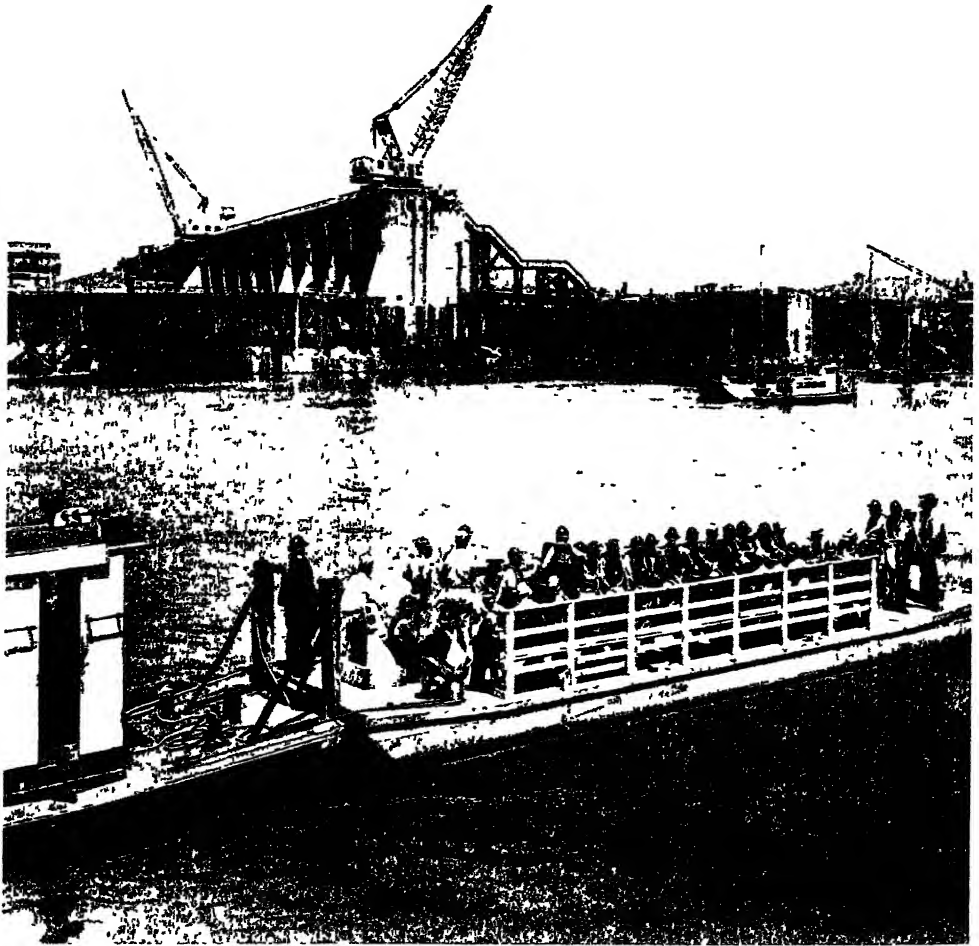


Work at the half-way mark at Fontana Dam in the Great Smoky Mountains.



This dam is the highest in the eastern United States—460 feet or the height of a 46-story building.

Earth-moving machinery was used at Pickwick, then moved to Chickamauga. A large hydraulic dredge used at Pickwick worked on other main-river projects. A concrete-mixing plant, completing its task at Norris, was brought down to Chickamauga. In the spring of 1943, when war had made new machinery of any kind hard to come by, much of the work at Fontana, high in the Great



Cofferdam commandos—hard hats and Mae Wests—at Kentucky Dam.

Smokies, was being done by mechanical veterans of many a tough campaign at other sites.

The building of a dam, let alone a series of dams, was a triumph of organization. It began long before any dirt was moved, with "tentative structural designs and estimates, geological investigations of dam sites, final designs of the project, soil mechanics investigations, design of the construction plant, studies in the hydraulic laboratory, and social and economic researches related to specific areas."

TVA had three engineering departments dealing with dams, planning, design, and construction. As former Chief Engineer T. B. Parker described them:

The Planning Department investigates the feasibility of the projects and prepares preliminary designs and cost estimates. Upon authorization by Congress the Design Department takes over. Its work is done by the "pool" system, where, for example, men experienced in the design of concrete structures do the concrete work for every project. Even before the designs are completed construction is started, because these major projects are built by force account with TVA equipment and personnel.

TVA did all the work, with two exceptions: to save time at the beginning it turned over the designing of the Norris and Wheeler dams to the United States Bureau of Reclamation; the design of the locks was done by the Army Corps of Engineers.

In each case TVA had to acquire the necessary land; had to clear the reservoir sites of all natural growth and all debris of human occupation; had to relocate all highways and railroads that might be flooded; had to move all graves; had to find rock for the "aggregate" to make the concrete; had to arrange for the housing, feeding, and sanitary protection of hundreds and even thousands of employees whenever the site was too far from a large community.



The right to work—and to receive the continuing benefits from that work.



Native labor has become skilled labor for the future.

If there was no near-by town, TVA built one. It built one at Norris, a permanent "model" village here, with vacation cabins and homes for people, mostly TVA employees, who commute by automobile or bus to Knoxville. As Fontana began to emerge



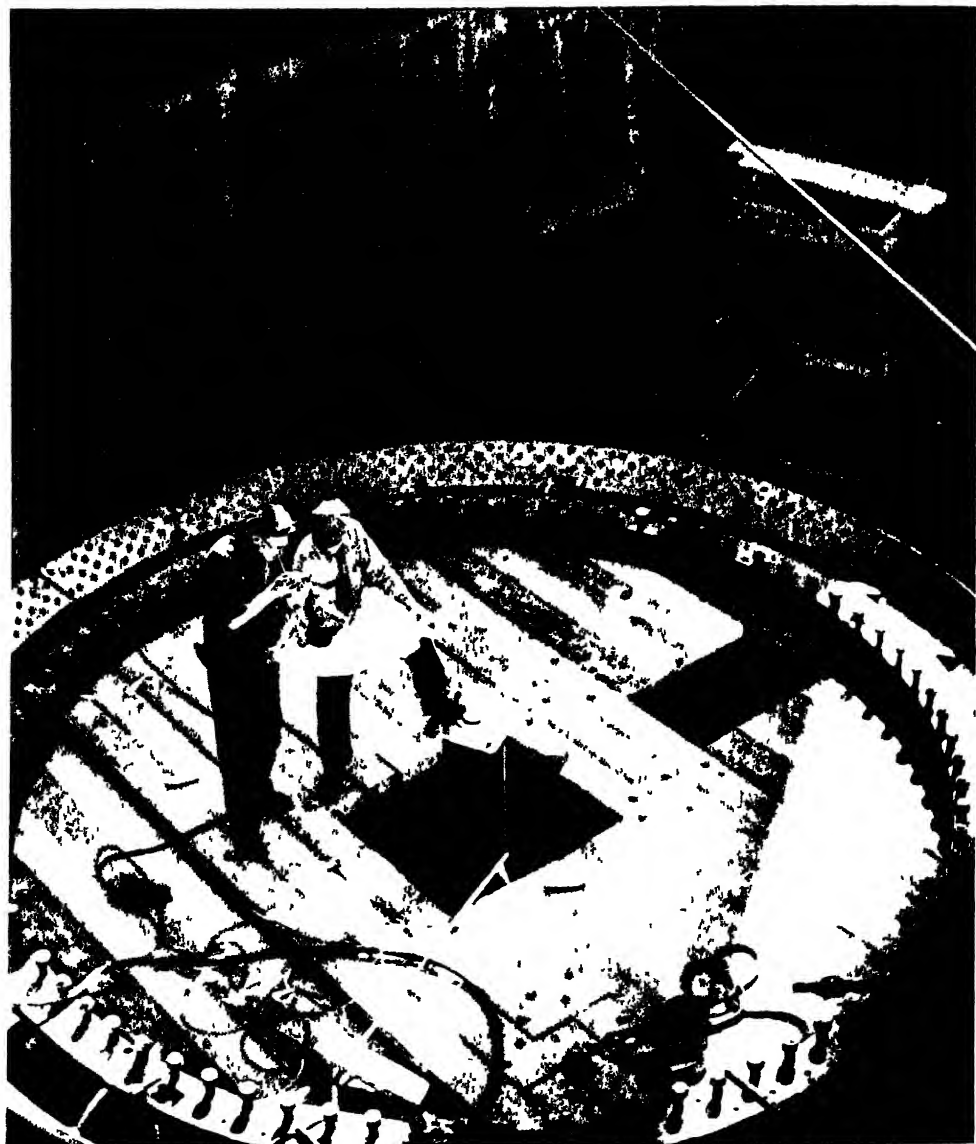
A water-wheel goes into a generator stall at Fort Loudoun Dam.

from the rocks in early 1943, TVA had a temporary village there for more than 3,000 workers and their families—a village with a big cafeteria, a beauty parlor, a bank, a drug-store, a recreation center, a school, and church services. There were two-section



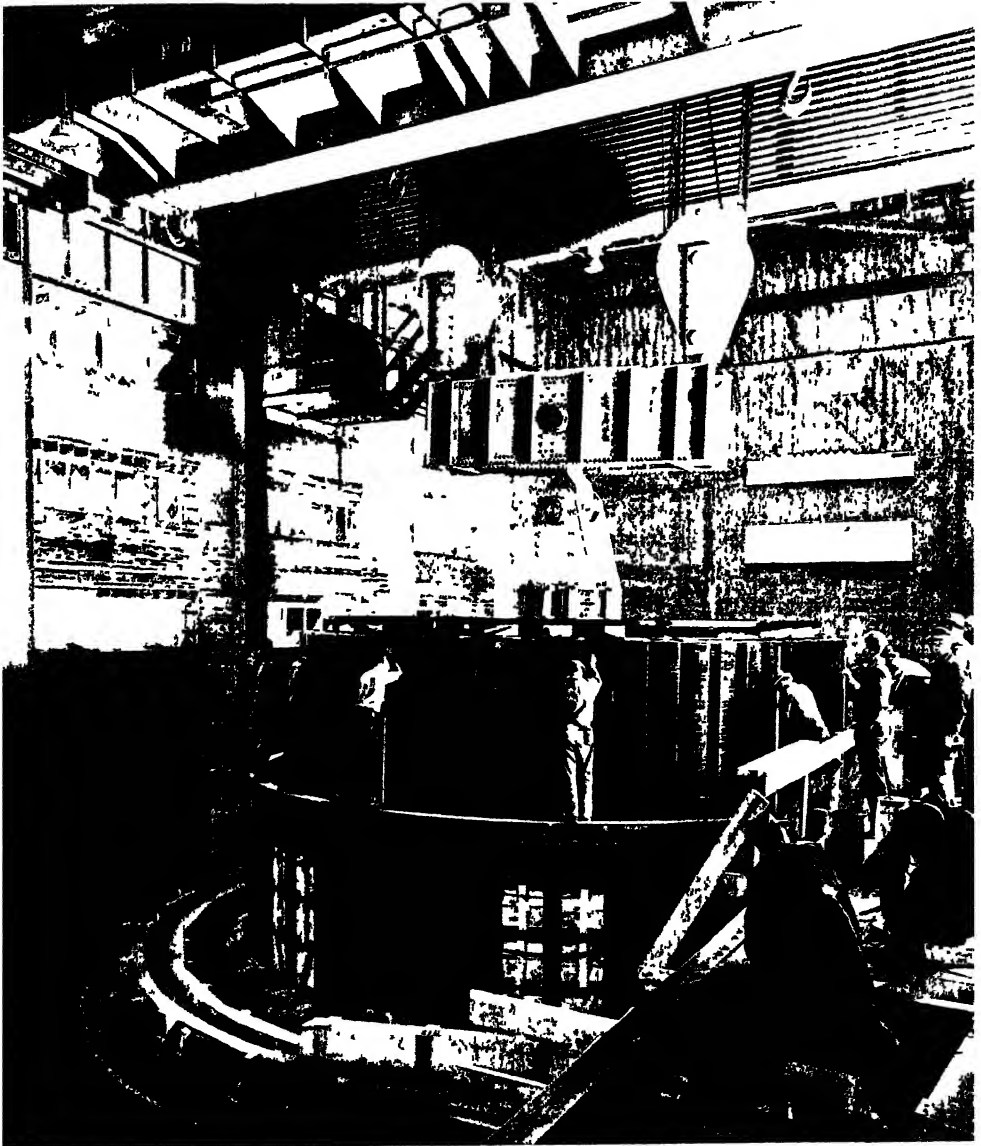
These buckets weigh two tons. They carry nine tons of concrete to the right spot.

portable houses, with window curtains, and flowers in window boxes. There were small children, dogs, graveled walks, streets with names—all this in an area where a year previous there had been only a cabin or two.



According to plan. Now for the speed ring. The speed ring of a generator lets in the right amount of water to make the right amount of electricity at any given time.

The big jobs went on inexorably, step by step. Sometimes they were interfered with by floods at critical times, and the construction engineers and their staffs fought the roaring waters for twenty-four hours on end without sleep. There were injuries and even



Installing the 250-ton rotor in a generator. Whirled by the force of falling water, it turns mechanical energy into electricity.

deaths, for this was a kind of war. Workers sometimes grew reckless, like men in battle. They fell from high places, were knocked into the water by booms swinging in gusts of wind, were caught

in machinery, were hurt by explosions. These things didn't often happen, for TVA had stern safety rules and a good safety record. But the danger was always there. Even a privileged visitor, scrambling around on half-completed dams, was made aware of it. There were alarming places where he didn't dare go, where men worked as cheerfully as in their gardens at home.

A visitor could see tenseness in men's faces, particularly during the war years. The ticklish time, said one construction engineer, is at the beginning, before you begin pouring concrete. The rest is

"just routine." But it was the routine of controlled and determined combat. Every dam had its own problem. On most sites you built cofferdams (temporary dams thrown around construction areas to clear them of water) and worked inside them, diverting the river outside. At Fontana you took the river through tunnels—this is easy to write about—and worked dry-shod above them. If there were holes in the underlying rock structure you forced concrete into them, like a dentist filling a tooth. Emergencies kept coming up. You dealt with them. It was all in the day's work. This was the "routine" of dam-building. But the dams were built.

And there they are.



Typical of the men who built Douglas Dam in twelve months and nineteen days—a world's record.

The best way to get the feeling of them at work is, perhaps, to begin at the top of the river system and come down, this being what the water has to do. The value of the dams is the manner in which the water is controlled as it does come down. In the words of former Chief Engineer Parker, "the ultimate objective is to make the flow of water do a maximum of good and a minimum of harm; to maintain navigable depths at all times; to provide storage for flood waters, and to generate the maximum amount of power consistent with the first two objectives."

It is like running a railroad, and in fact the flow of the water is handled by a dispatcher's office.

One has to think of all the pools or reservoirs working for all attainable purposes at the same time. In the main river, for obvious reasons, there cannot be much storage of water: the banks are too low, the adjoining land too valuable. The dams in the tributaries serve this purpose. There are thus two types of dams: those in the main river relatively low and long; those in the tributaries usually higher (Norris, 285 feet; Hiwassee, 307.5 feet; Fontana, 460 feet, highest in the eastern United States) and shorter. The tributary dams have no locks. The main-river dams have concrete spillway sections and, with the exception of Wheeler, earth and rock-fill abutment sections. The tributary dams, such as Norris, Hiwassee, Douglas, and Fontana, are all concrete.

But in a sense these dams are all one big dam—with compartments. This big dam is operated



"The human stock is good in the Valley. It is the opportunities that have been lacking."

on a basis of constant weather forecasts, constant measurements of precipitation and run-off; swift decisions as to when and in what quantities water is to be released or held back. Flood-control, as former Chief Engineer Parker said, is "the most difficult and exact operation." The excess water must go down-river at a time when it will do the least harm. It must go down anyhow when the reservoirs are full. The reservoirs therefore must not be full when flood water is likely to come along. It isn't easy and never will be.

But it works. Chattanooga must still have local protective works to guard against the block-buster floods that come at rare but unpredictable intervals; there was one such in 1867 and may be another next year or perhaps not for fifty years. But Chattanooga is now safe against all ordinary floods—and these "ordinary" floods, recurring at frequent intervals, inflicted more damage in the long run than the occasional great flood. All the way down the Tennessee the river towns are now safer. In the Mississippi itself, by the time the Fontana and Kentucky dams are completed, TVA storage will reduce the flood crests by as much as three feet at Cairo—possibly the difference between security and disaster—and in some degree three-fourths of the distance from Cairo to New Orleans.

Now let us take a comprehensive look at the dams, first swinging clockwise across the fan of eastern and northeastern tributaries. The dates show when the dams were closed and began to hold back water. Here they are:

| | |
|---|------|
| Norris, on the Clinch | 1936 |
| Cherokee, on the Holston | 1941 |
| Douglas, on the French Broad | 1943 |
| Fontana, on the Little Tennessee | 1944 |
| Hiwassee, on the Hiwassee | 1940 |
| Chatuge and Nottely, above Hiwassee, storage dams | 1942 |
| Apalachia, below the Hiwassee Dam | 1943 |
| Ocoee No. 3, on the Ocoee | 1943 |

In addition to these dams, which it constructed, TVA bought Ocoee No. 1, Ocoee No. 2, and Blue Ridge dams, all on the Ocoee River, a tributary of the Little Tennessee. By agreement it controls the water releases of five dams built by the Aluminum Company of America on the little Tennessee: Calderwood, Cheoah, Santeelah, Nantahala, and Genville. Outside the Tennessee River system it owns Great Falls Dam on a tributary of the Cumberland, which was purchased with other properties of the Tennessee Electric Power Company.

Now come the main-river dams, again with dates of closure:

| | |
|---|------|
| Fort Loudoun | 1943 |
| Watts Bar (steam and water both at work here) | 1942 |
| Chickamauga | 1940 |
| Hales Bar (the old private dam) | 1914 |
| Guntersville | 1939 |
| Wheeler | 1936 |
| Wilson (started during World War I) | 1925 |
| Pickwick | 1938 |
| Kentucky | 1944 |

These dams have converted parts of the Valley into a land of lakes, where there weren't many lakes before. A man on the moon with a good telescope could pick out the pools they have formed, and at sunset or sunrise the shadows of the great concrete walls. They gather, hold, release the power of the river.

Their total area is more than half that of the state of Rhode Island. They hold enough water to cover half the state of Tennessee



Engineer, enemy of error.

or almost all of West Virginia (if the land was flat) a foot deep. They provide 650 miles of nine-foot river channel to Knoxville, all the year round. And they make it possible to generate electric current for more than half a million residential consumers, through 84 municipalities and 45 co-operatives, in addition to the vast war industries and other enterprises in the Valley. They are



"If the men and women in the construction camp are contented and happy, the price of concrete comes down."—Fred Schlemmer, Project Manager, Fontana Dam.

tied to nearly 6,000 miles of transmission line, about half of which was built by TVA. They increased river traffic from 32,658,951 ton-miles in 1933 to 161,469,344 ton-miles in 1942, and this is a beginning.

They have done something else, that can hardly be measured in figures. From the beginning TVA has used Tennessee Valley labor as much as possible, drawing it from as near the location of its projects as it could. Thousands of residents from the seven valley states, both skilled and unskilled, have had their first experience with large-scale projects from TVA. Many of them have been better fed and better housed while at work for TVA than ever before in their lives. Job training, adult education classes, library service, new schools, new chances for recreation—these have come with TVA.

People have had their eyes opened by the work on the dams and by the life that went on in the new or old communities near the dams. Some of them had never had electricity in their homes before. They are no longer content to be without it. Their imaginations have been stirred in other ways. They have seen what orderly, large-scale, long-range planning means.

If a river can be controlled for human welfare by a Federal agency, perhaps there can also be planning for the same purpose by and for the people living in the Valley.

Washington didn't have to preach this doctrine. It preached itself.

6.

White Magic

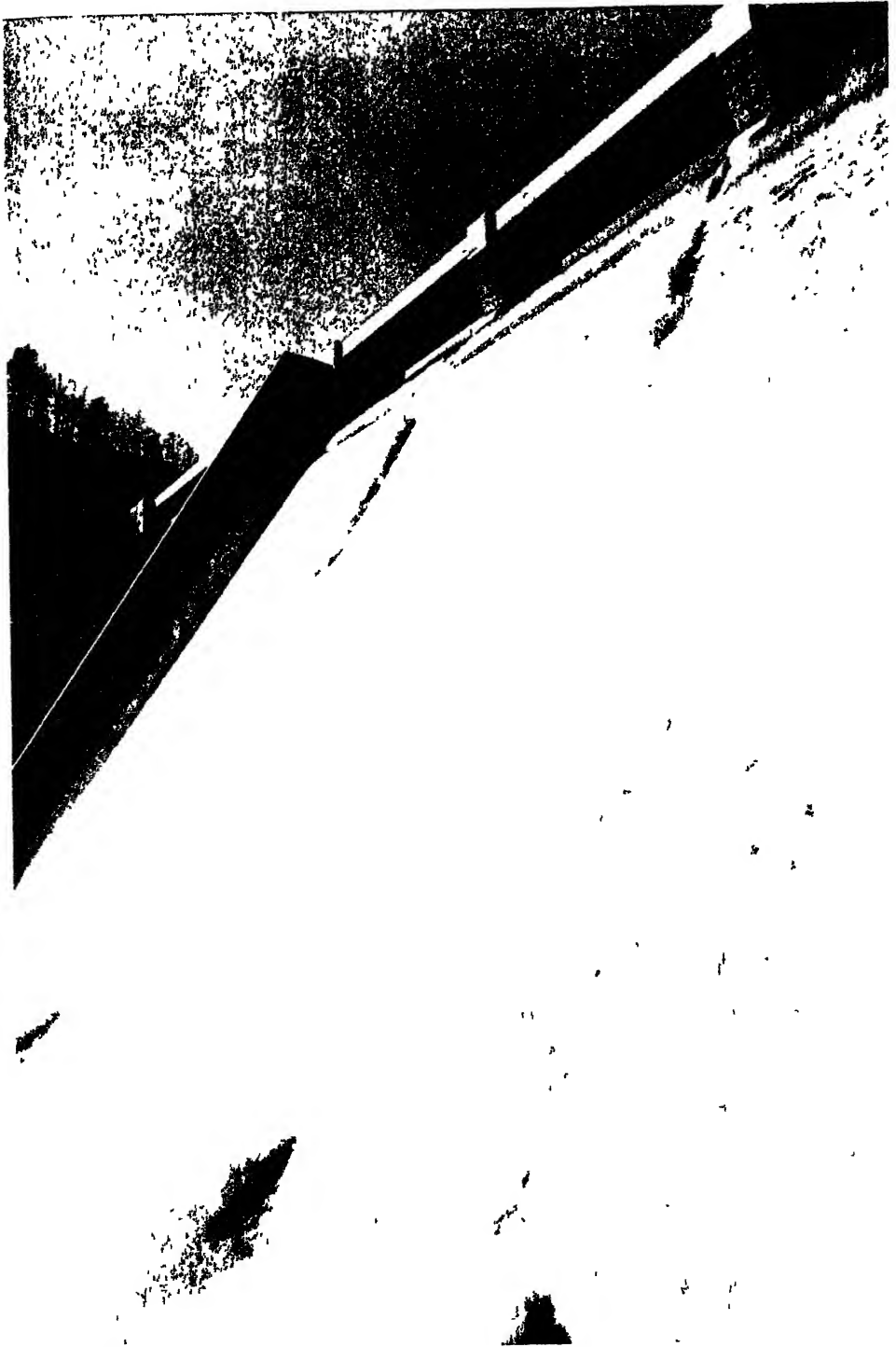
"Those who feel that America has slept and lost its stride and vigor should see the TVA area now. The important changes here are the sum of little things."

RUSSELL LORD in "SURVEY GRAPHIC"

TVA was authorized and expected to perform some chemical miracles at the Shoals, and it did. After more than a decade it is nowhere near through with miracles. Probably it never will be.

The two old nitrate plants were sitting there, in 1933, with the swallows flying in and out and nesting among the girders. The farmers in the Valley and beyond the Valley were no less eager for cheap fertilizers than they had been when Henry Ford made his offer for the Muscle Shoals installations in 1921. TVA had an enabling clause big enough to drive a hay wagon through. It could employ "any process or processes that in its judgment shall appear wise and profitable for the fixation of atmospheric nitrogen, *or the cheapening of the production of fertilizer.*"

The ironical truth was that the nitrate plants were of no use for their original purposes. Plant No. 1 never had worked and never would. It was one of the costliest aggregations of scrap metal in existence. Plant No. 2, which was to have produced nitrates by



The flood danger downstream having passed, Norris Dam releases the water it held back.

The Valley and its People

the cyanamid process, had had a test run. It would work. But it could not be worked economically and working it would not help to "cheapen the production of fertilizers."

TVA thought not only of nitrate plants but of land, crops, animals, and people. It did not go ahead with nitrogenous fertilizers: first, because it was not well equipped to do so; second, because the law did not require it to do so; third, because it did not believe it wise to do so. For a century or so nitrates in some form had been used on American soil. They had not prevented a terrible sequence of destruction. As TVA said in its 1937 report:

Cotton land, for example, is commonly fertilized with commercial fertilizers, containing nitrates. The system is a vicious circle. As the land grows poorer the farmer must buy more nitrates. To buy them he must plough up the hillsides and grow more cotton. The more cotton he grows the lower goes the price. More land washing away, less money for the crop, more fertilizer needed, and less money with which to buy it.

The way to save the land and the farmers in the Valley and elsewhere was to help the farmer to grow his own nitrates; and the way to do this was to develop phosphate fertilizers. Potash was needed, too, but the crisis was not so acute. Lime was needed, but there was plenty of it. Phosphate was one element that crops, animals, and people couldn't do without and weren't getting enough of. When it had been taken out of the land nothing could replace it. In a few areas, as in the so-called bluegrass regions of Kentucky and middle Tennessee, it existed naturally in seemingly inexhaustible quantities. In most areas it did not, and had to be supplied.

It was therefore decided to experiment primarily with phosphates at the Shoals and to try out the resulting fertilizers, when fully tested, on demonstration farms. The plan was simple. The farmer would enrich his soil with phosphates. He would procure his nitrates by growing leguminous plants, such as alfalfa, lespedeza,

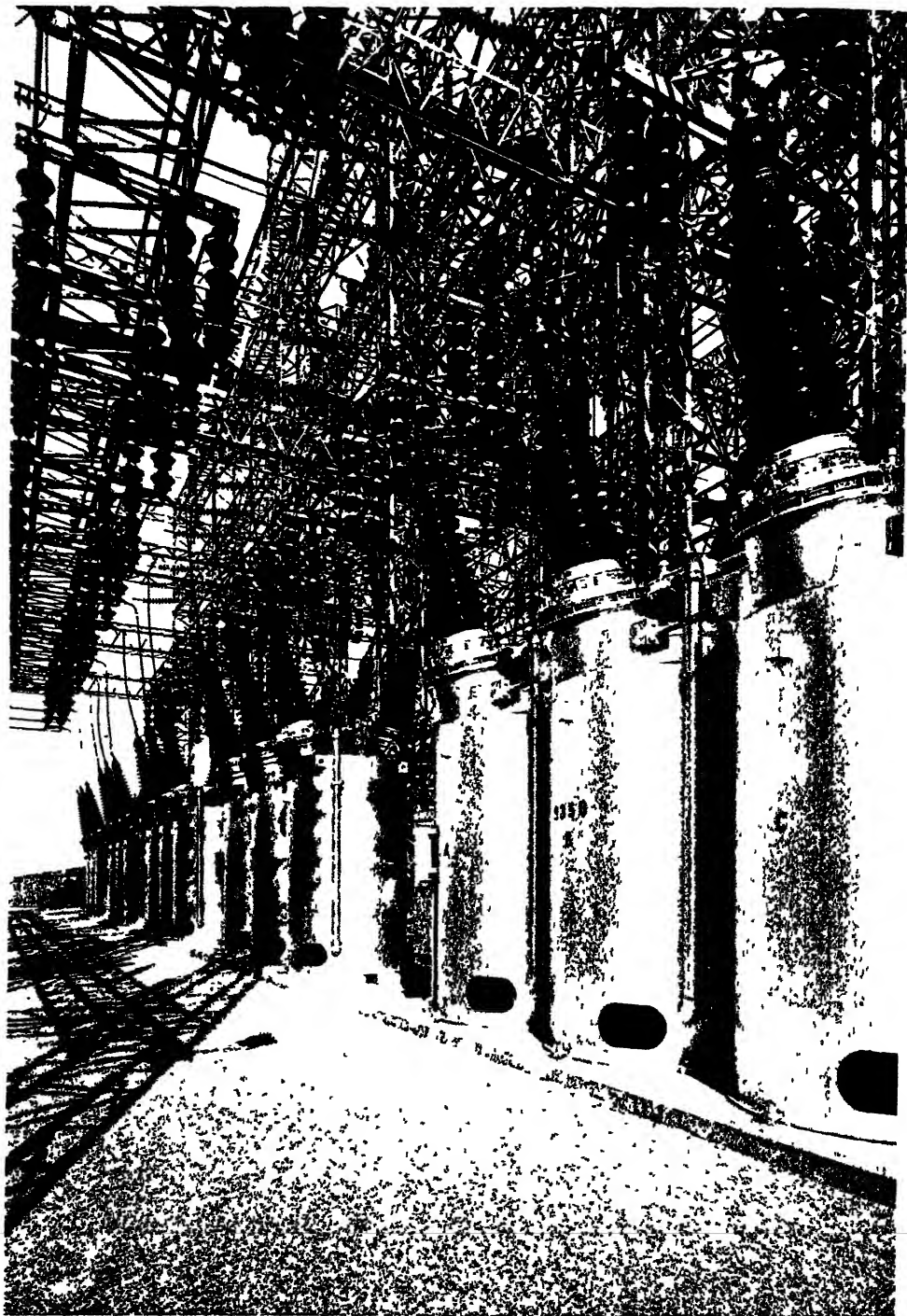
vetch, and clover. These plants have the happy faculty of nourishing on their roots a certain kind of bacteria which in the processes of their life cycle take nitrogen from the air and introduce it into the soil. One pound of phosphorus used in fertilizer for leguminous plants may result in four or five pounds of nitrogen in the soil.

The nitrate cycle spiraled down to ruin, but the phosphate cycle spiraled up. For the clovers and vetches, the alfalfa and lezpedeza would be planted on land which would otherwise lie exposed to the elements. It would keep that land from having its priceless topsoil washed away.

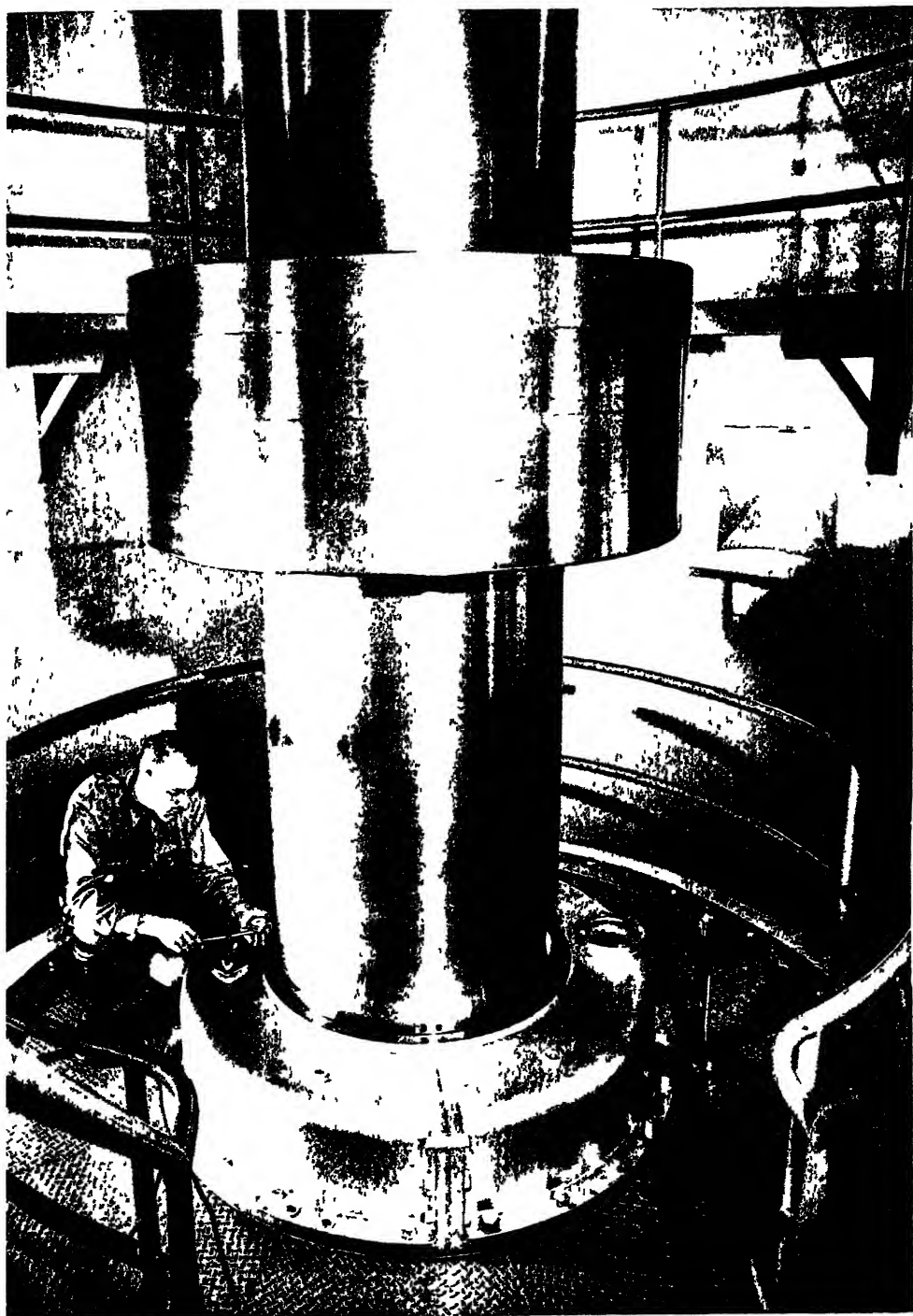
Working with phosphates at the Shoals, the chemists could watch the river. They could be thinking of the millions of sloping acres, up the draws leading back from the main stream, up the big tributaries, up in the foothills of the Smokies, up on the Cumberland Plateau. And they could know, as surely as God made little apples, that if enough farmers on those acres put enough phosphate on their land, plowed on the contours instead of up and down, rotated their crops in the right way, matted down their soil with leguminous roots, the yellow murk of the river would grow steadily clearer as the years went by.

Tons of rich earth, millions of dollars in land values, the possible happiness of millions of the living and the unborn, could be saved from destruction. They knew this could be done. And it is being done, not all at once, but inevitably. This is the great miracle of the Shoals, though not the only one.

TVA could get natural rock phosphate quite near the Shoals. It could modify some of the electric furnaces in Nitrate Plant No. 2 to process it. With these furnaces and plenty of cheap electricity it could use a lower grade of phosphate ore than that required by the prevailing commercial processes, which had not been much improved for at least fifty years.



Electric current from Norris generators is here stepped up from 13,200 volts to 154,000 volts for transmission.



This shaft is the connecting link between water-wheel and generator at Hiwassee Dam.

The chemists went to work to get a concentrated form of fertilizer. They wanted to end the waste involved in shipping and handling fertilizers which contained as little as 16 per cent of plant food, with 84 per cent of inert material. A layman might think this would be easy. Just leave the inert material out, he would suggest. The problem is not, in fact, so simple as that. Phosphoric acid could be, and was, produced. A stable, concentrated fertilizer of uniform quality was harder to get. For concentrated superphosphate the concentrated phosphoric acid was mixed with finely ground phosphate sands. This product has been TVA's leader in the fertilizer field. For the more recently developed calcium metaphosphate ("metaphos") phosphorus is burned in a combustion chamber and the resulting gases passed through phosphate rock or sand. "Metaphos," with nearly 65 per cent plant food, is possibly the phosphate fertilizer of the future. During its first decade TVA produced 521,790 tons of concentrated plant foods, and by the time of Pearl Harbor it was also able to use phosphorus in nine very deadly products for war use.

When a fertilizer was created, it had to be tried out. This was done first on control plots and in the agricultural experiment stations, not only in the Valley but, by their own request, in stations in every state in the Union. When the tests were satisfactory the next step was actual use on demonstration farms. At this point TVA invited the co-operation of the Agricultural Extension Service and the land-grant colleges, and of course of the farmers themselves. Such co-operation was always eagerly given. The practitioners and students of American agriculture were not asleep. They wanted to learn how to save land, how to save labor, how to grow better crops.

The procedure was to select one or more demonstration farms in any community that wished to have them. A committee of



Electric furnace at Muscle Shoals. For more than eighty years there had been no major change in the methods used in preparing commercial phosphate for agricultural use.



Power to develop the latent resources of the area.

farmers, perhaps with the advice of the extension agent, might make the selection. The successful candidates had to be men in whom their neighbors had confidence, though their land didn't have to be the best. In fact, the experiment was more interesting if it wasn't the best.

Each chosen farmer got his fertilizer free of money cost, except that he had to pay the freight from Muscle Shoals. In addition he promised to follow a five-year program of cropping, use of lime, and fencing agreed on in consultation with the county agent and the land-grant college extension service. Since the object of the program was to increase his well-being he had no objections to this much coercion. If he was unwilling to change his habits he didn't become a demonstration farmer.

The demonstration farm invariably attracted attention for miles around. The whole community was concerned about it. There would almost always be somebody leaning on the fence, studying what was happening. When good results began to show, other farmers would want to imitate the demonstration farmer's methods. The idea spread. There was not enough TVA fertilizer to provide for everyone who could use it, but almost any farmer could get some commercial phosphate, at least, and could follow the plowing, planting, and cropping sequences that had been laid out for the demonstration farmer.

In many cases the initiation of the farmers themselves led to what are called area demonstrations, in which a number of farms, running to a total of as high as ten thousand acres, were all operated on the same plan. The advantages of community co-operation could then be seen. A group of farmers could buy threshers, grading equipment, and blooded bulls when a single farmer couldn't, and could find means, when he couldn't, to get their dairy products or other output to market.

In this way a kind of contagion of better farming began to catch hold. It was not confined to the watershed of the Tennessee River, although the greatest part of the demonstration acreage was there. Beginning in 1935 fertilizer was sent outside the TVA area, and by 1943 there were 43,000 demonstration farms covering a total area of 6,375,000 acres in twenty-eight states. About eighty-five per cent of this land lay in the seven states of the Valley, but the influence of the phosphate gospel was nation-wide. By a dicker with the Agricultural Adjustment Administration nearly half the



One hundred and fifty co-operatives and municipalities under non-political citizen management distribute TVA electricity to the people.



J. P. Irwin and TVA's "white magic" made three blades of grass grow where one grew before. He did it on rough and rocky land in Anderson County, Tennessee.



A farmer with an axe to grind believes in co-operative distribution of electricity.



An electric corn-sheller.

total output was delivered to farmers in lieu of the cash payments provided under the AAA Act.

On the average there was an increase of more than thirty per cent in the output of the demonstration farms, in foods directly essential to the economy of war and peace: meat, eggs, and dairy products. The program had to be curtailed when TVA began to send large quantities of concentrated fertilizer abroad, mainly to Britain. One cargo of phosphate concentrates might take the place of five or six cargoes of food. In a manner of speaking, TVA created demonstration farms in Britain, as one way of helping win the war.

But these shipments are a temporary measure. The demonstrations in this country will be expanded when the war is over. In time the vast phosphate deposits north of the Great Salt Lake—possibly ninety-five per cent of the total American phosphate resources—may be opened up, private enterprise can take over where TVA leaves off, and every farm in the United States may become in this respect a demonstration farm.

It is not an impossible dream, born in the murmur of the controlled river, where in the old days the white water ran.

Behind the statistics are the life stories of human beings—many thousands of them. Here is a farmer with nine children in an eastern Tennessee county. The depression cleaned him out. He got a job out West and lost it. Returning to his land, hoping at least to get something to eat from it, he met with a new misfortune: his house burned down. He moved his family into an abandoned three-room shack. He was stuck with a \$2,500 mortgage on property for which he had paid \$6,000, and for which the best offer he could get was \$2,000. This man didn't get rich when he was chosen as a demonstration farmer, but in five years he did these things: borrowed \$700 from the Farm Credit Administration and

paid back all but \$48; reduced his mortgage to \$1,000, raised the market value of his land and buildings to \$8,840; rebuilt the shack into a comfortable home; and provided his family with a better diet and better living conditions generally. That man was saved by phosphate. This sounds like a patent-medicine testimonial, as do most stories of this kind, but it is strictly true.

Another eastern Tennessee farmer was getting practically nothing from his 125-acre farm, 40 acres of it woods. His cash income came from hauling logs and driving a school bus. He put phosphate fertilizer on his loam and followed other approved practices.



Crimson Clover. This legume fits well into practical farm rotations, furnishes high protein grazing, and provides a thick sod effective in controlling soil and water losses. Turned under, it supplies from 80 to 100 pounds of nitrogen per acre.

In a few years he was receiving milk checks at the rate of \$250 a month and \$800 a year from eggs, besides raising almost all the family's food. A Negro in Marshall County was struggling with a heavy mortgage on a \$6,000 farm. After three years as a demonstration farmer he could see his way to paying off the entire debt in two more years; and this with a continuous increase in his living standards.

These people were getting a Government subsidy—two subsidies, perhaps, if AAA payments are added to the free fertilizer. But subsidies wouldn't have pulled them out of the hole if they



Sod and terraces save the hillside soils.



When the soil is well cared for it grows good homes too. His farm, shown on opposite page, is on the shores of Cherokee Dam Reservoir.

hadn't been willing and able to help themselves. They were individualistic pioneers who needed a toehold. The man who manages to raise sixty bushels of corn an acre on shale soil that seemed hardly good enough to grow healthy weeds; the man who gets ten thousands pounds of milk in three hundred days out of a nineteen-dollar cow; the man who has saved his soil by terracing and has done all this with his own labor and sweat—these men don't feel like pensioners. And they aren't. Once they get started they can keep going. They won't need any more help.



Alfalfa is holding water on the land. The reservoir in the background is holding water in the river. Grass and small grain will also be grown on this slope.



(top) Out of these TVA nurseries farmers have planted 150 million trees on eroding land.

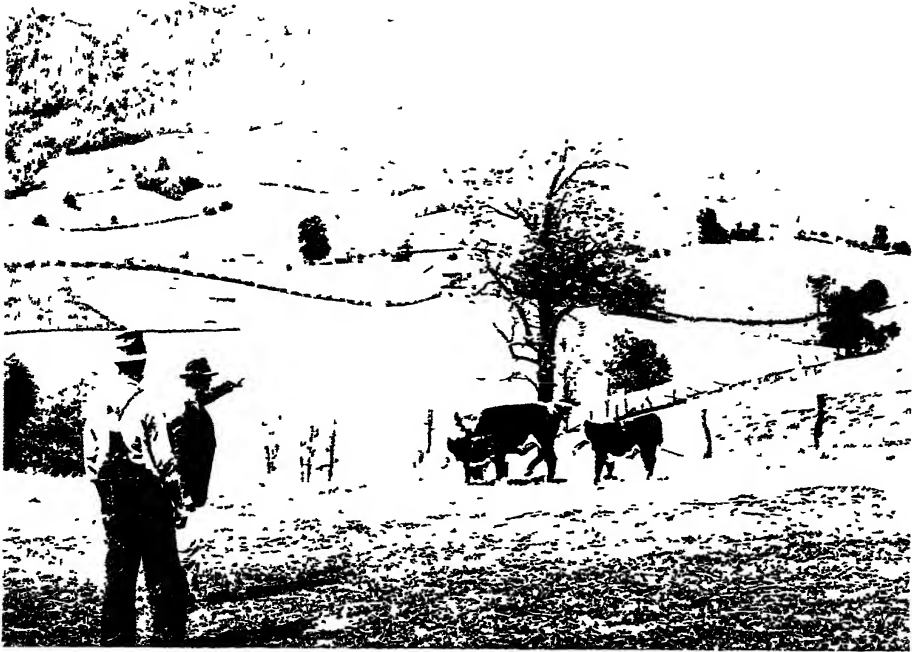
(bottom) Where the Valley land lies flat it is ideally suited to the growing of cotton.



With TVA phosphate, this Mississippi farmer has turned half of his former cotton land over to grass and livestock.



A permanent pasture will remain permanent only if the phosphate that comes off in milk and meat is put back.



The county agent points the way—plow-crops on the level land, pastures on the gentle slopes.



Designed by TVA for the little farmer, this thresher is towed easily by an ordinary passenger auto.



State engineering schools and TVA designed a new type community food dehydrator. Here are the products—fresh, dried, and served.

The farm demonstrations have increased hay production by one-third on sample farms; small grain by two-thirds; corn by one-fourth, cotton and tobacco by one-half with little or no increase in acreage; milk sales by one-half, egg sales by one-half; hog sales by two-thirds; fruit and vegetable sales by one-half—all with little or no increase in labor force.



A county agent and a demonstration farmer audit the books to see what has been gained by proper use of the soil.

The Valley and its People

Private enterprise has its innings. The demonstration farmers bought, and will continue to buy, more farm machinery, more paint, nails, lumber, plumbing fixtures, and electrical gadgets, and probably more clothing and small luxuries. Even the commercial-fertilizer manufacturers can afford to be complacent. In ten counties where tests were being operated the farmers bought about eleven times as much commercial fertilizer as in comparable areas where there were no demonstration farms.

Driving through the bluegrass country of middle Tennessee, one is immediately conscious of the fact that good soil grows not only good crops but comfortable and even luxurious houses, substantial, well-cared-for barns, sleek livestock—and happy-looking people. The effect of the phosphate cycle, coupled with scientific farm practices, is to extend these conditions to areas which have been poor to the point of desperation.

It will take a long time. It has been interrupted by the exigencies of war. But it can and will happen.

The story of concentrated phosphate fertilizers is not the whole story of TVA's activities at Muscle Shoals. If the layman has trouble with the chemistry of phosphates he will have more trouble with some of the other chemistry that is going on there. During the war TVA has been making ammonium nitrate, a basic material in today's high explosives. It makes calcium carbide, which enters into the manufacture of the synthetic rubber called neoprene. It is experimenting on a respectable scale with the production of alumina, the basis of aluminum, from clay; if this attempt succeeds in commercial terms we shall no longer have to depend on foreign deposits of bauxite. It is extracting magnesium from olivine—important for the strategic future if this process replaces present methods of extraction from brine and sea water.

Decidedly TVA is not lagging in its direct contribution to the

national defense. Our enemies have felt the ferocity of the full strength of the Tennessee River. TVA can kill when it has to.

But in the long run it is more important in building and saving the lives of men, in bringing out the riches of the earth and of humanity. This is the white magic of the Shoals: magic of blazing furnaces; of great, steaming, cathedral-like halls; of quiet men juggling with small apparatus and formulas; of the thunder of the river made calm and beneficent.

The rain falls on the high hills. The little rivulets do not so often run red or yellow with ruin. Farmers' wives smilingly count the eggs. Men carry up pails brimming with rich milk. There will be green peas from the garden tonight and enough strawberries for a shortcake, and sixteen-year-old Jimmie will be going to the State University year after next.

People stand straighter, with more hope and more self-confidence, because the water of the Tennessee is going through the turbines that turn the generators that produce the electricity that fires the phosphate furnaces.

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Food dehydrator.



Quick-freezing strawberries.



Farm kitchen.



Electric churn.

7.

“The People in Said Basin”

TVA had been instructed by Congress to promote the “economic and social well-being of the people living in said river basin.” Who were those people?

They certainly weren’t all alike, any more than the spots of earth on which they lived were all alike. Some of them were Negroes: close to one in twenty in the whole state of Tennessee; about one in twelve in the whole state of Kentucky; about one in two in the whole state of Mississippi. There were towns where there were a great many Negroes, and towns where there weren’t any. Most of them were down in the old cotton country to the south and over toward the Mississippi.

No statute could alter the psychology underlying the interracial situation. The TVA Act didn’t recognize that there was such a situation. Local folkways in the Valley, as elsewhere in the South, said the races should be segregated, and TVA in its camps followed the folkways. It did pay equal wages for equal work, and when it did things for farmers the Negroes had a chance just the same as the whites.

Its work in the Valley was bound, nevertheless, to have an effect on the status of the Negro. Racial antagonisms flourish where there is a shortage of something men want: jobs, houses, opportunities.

Fear has more to do with them than pride. Poverty creates tensions. When incomes and living standards go up, these tensions relax. Racial troubles in Northern war-boom cities do not prove the contrary, for in those cities, though incomes have gone up, the things that men wish to buy with their incomes—good homes, convenient access to their jobs, facilities for recreation—have remained scarce.

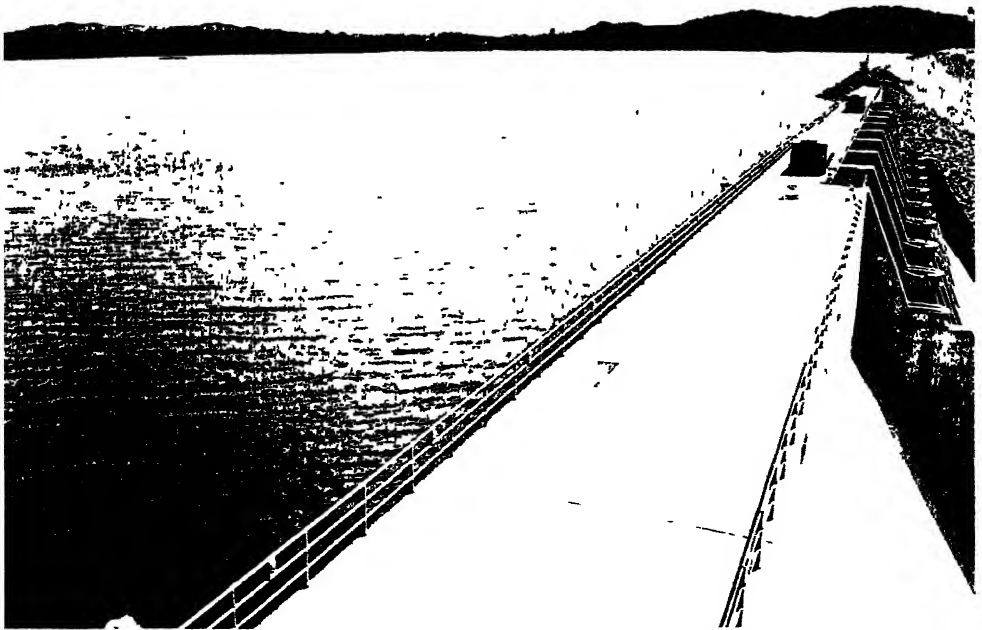
But the Negro, as part of "the people living in said river basin," does benefit by everything that TVA does that adds to the Valley's prosperity. Hate and fear don't flourish when most families are fairly comfortable. The opportunities electricity and its applications produce make the Valley economically more spacious, and in that spaciousness there is room for increased goodwill. In the long run TVA is making it easier for Negroes and white people to live side by side without trouble. In the long run: one won't read of a sudden transformation in tomorrow morning's newspapers.

The white people, like those in most parts of the old South, are homogeneous, which is to say that they are mainly of English, Scotch, and Irish derivation. The tides of modern immigration didn't come that way. There has never been much in the Valley for a century past to draw streams of immigrants; the newcomers to this country either crowded into the Northeastern cities, or flowed westward, north of the Mason and Dixon line, along the railroads that for them took the place of river valleys.

This purity of the stock is probably a good thing for the Valley in some ways and a bad thing in other ways. It seems good to many people as a source of family, community, and regional pride. It makes for mutual understanding. It preserves many fine old traditions, including the old songs that go on being sung in the mountains in spite of all the new songs that the radio has to offer, and the old stories, ballads, and dances. On the other hand, it has kept out the stimulation of strangeness. The Valley folks might have had

an irritating time of it trying to absorb an influx of Germans, Rumanians, Scandinavians, Russians, and Poles, with Catholic churches and Jewish synagogues competing everywhere with the old Protestant meeting houses, but in the pre-TVA days the effort might have stirred them up and kept them moving in a livelier fashion.

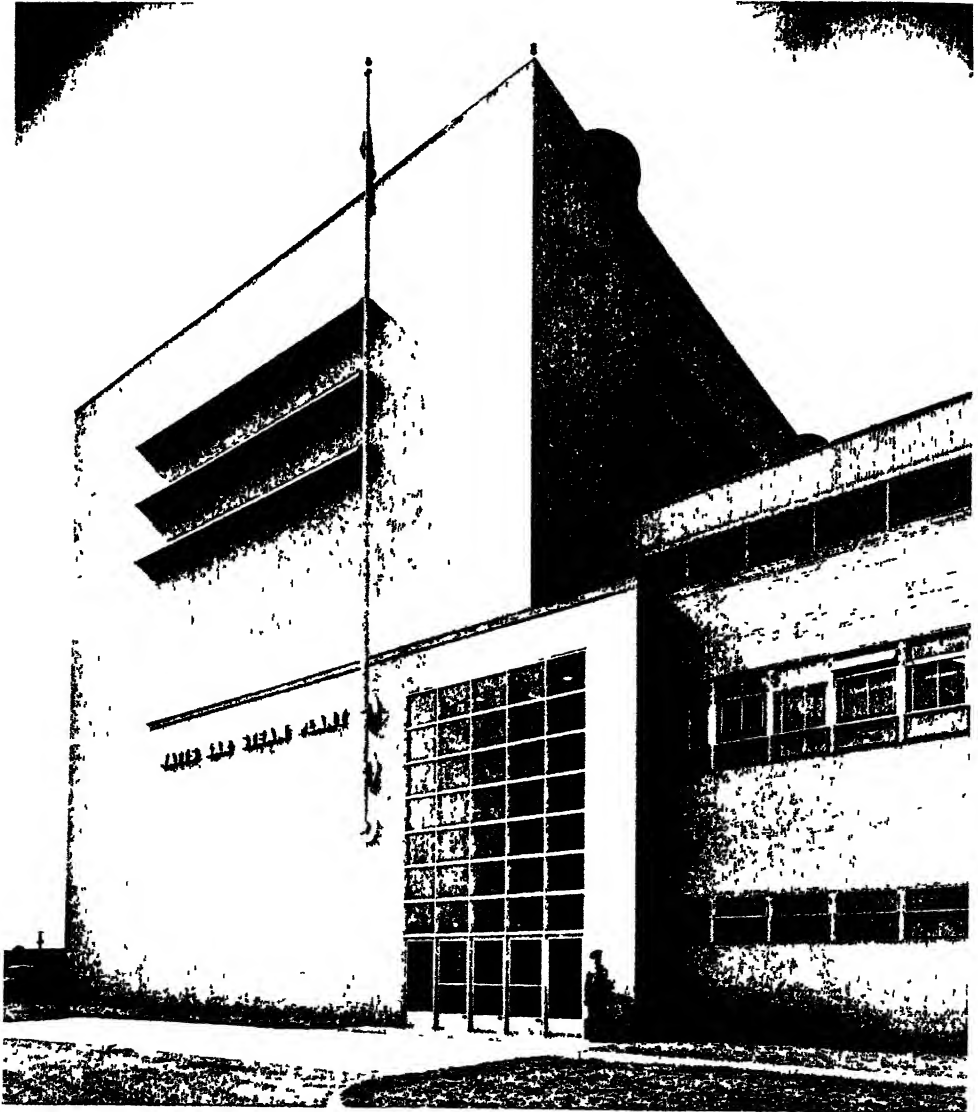
At any rate the Valley largely escaped both the risks and the benefits of varied populations. It remained an old-fashioned American community. In fact, when visitors from Northern states found it a little foreign the reason may have been that it was, in the older sense, so very American. One could readily believe, as one went about the Valley a decade ago, that the Civil War and also the



Man can build for beauty as well as utility—Cherokee Dam and Lake.

Revolutionary War had actually taken place—and this is sometimes difficult to do in Gettysburg or in the shadow of the Bunker Hill Monument.

A good many generalizations have been made and can still be made about the white people of the Valley. Most of them admit of so many exceptions that they are not really true. In Tennessee



The very absence of architectural "styling" gives this structure its style.

alone there is a sharp division, largely due to topography and the nature of the soil, between the eastern mountain and plateau areas, the central basin, and the western lowlands. Of the cities Knoxville retains most plainly the stamp of the Scotch-Irish Covenanter; Chattanooga has an urbanity that Knoxville lacks; there is a kind of Northern hustle and bustle in Nashville; and Memphis, the planters' capital, with some of the beauty and some of the mud of the Mississippi in its make-up, is turned as the river goes, toward the deep South—and yet has a Western touch, too.

There are textile towns in the Valley's northeastern section that would seem strange to a man from the old cotton metropolis of Corinth, Mississippi. The shut-in mountain hamlets and farms in the Great Smokies and their foothills have an atmosphere a bit different from that of the villages and "dog-trot" cabins on the wind-swept Cumberland Plateau; and the bluegrass plantations are as removed from either of them as Iowa is from the rocky uplands of Vermont.

The river towns, all up and down the main stream, are of their own species, and no other. On the big river men's thoughts go along with the stream, and it is just a step from Guntersville or Decatur to Cairo, New Orleans, and ports beyond the seas. The imagination feeds on the familiar things that hem one in, the blue crests and the clouds moving over them, or it ranges the earth like the trade winds, all this to some extent depending on where in the Valley one happens to live.

When more Valley people get to writing poetry and stories we shall know more about these matters, but one feels, in looking at them and talking to some of them, that this is the way it is.

The Valley is the people living on isolated farms, in little market towns, in textile towns, and in the cities. It is people who plant crops in the dark of the moon, for luck, and people who terrace



Electricity is "mighty handy" for Mrs. Nolan Stafford. She and her husband bought forty acres in the Valley last year.



Mark Smith "looks after" a walk-in refrigerator owned and operated by eight farm families. It is located on his own farm.

their lands and use improved phosphate fertilizers. It is people who believe that John Thomas Scopes was justly convicted and fined, in Dayton, Tennessee, in 1925, for teaching the forbidden doctrine that "man has descended from a lower order of animals"; and it is also people who regard Charles Darwin, not as a dangerous innovator, but as a classicist who has been left far behind by the march of modern genetics. It is people who consider anyone from beyond the state boundaries, or sometimes even the county boundaries, as a "foreigner," and it is people who know New York City fairly well and keep up with the latest ideas in magazines and books.

The total effect is conservative. Words like "socialism," "communism," and even "trade-unionism" have always alarmed many Valley people. This was and is about the last place in America in which one would expect a revolution to begin. If TVA had been described as a revolution, or even as a wholly new idea, the Valley would not have welcomed it. And in general the people are willing to accept certain demonstrable facts and principles, whereas they might shy away from the hifalutin words that describe them.

There was a legend about the Valley that is comparable for foolishness with the whiskery tale of the metropolitan tenement dwellers who kept coal in their new bathtubs because they preferred to wash themselves in the dishpan, or not at all. This legend assumed that Valley people liked to get poor crops out of poor land, preferred dirt roads and mules to hard roads and automobiles, and would rather have malaria, hookworm, tuberculosis, or chronic malnutrition and the privilege of being lazy than overcome these ailments and have no excuse for not being energetic. It just isn't true.

The pioneer stock hasn't gone to seed. It still has character and virility. What it needed was something outside itself of which it had been robbed by unhappy circumstances. It needed hope for

the future. Hope is the pioneer's mainspring. He can't keep it wound up when every year the same amount of work brings in worse returns. But if he can inch ahead year by year, get a little more corn out of the old field, increase his milk yields, get more work done because he has electricity and machinery to help him, pay off his mortgage, paint his house, put in new plumbing and other gadgets, give his children better schooling—then he will be as good as he ever was, and as good as his ancestors were, which is pretty good.

One can't go up and down the Valley without perceiving that these are competent Americans who have been tempered rather than weakened by adversity. Their speech has a sectional drawl, but their faces are not distinguishable in general from those one might see in Vermont or Kansas: weatherbeaten, angular, often lantern-jawed, with a glint of humor. They have worked hard and they show it. They have worried and they show that. They have the American lines of stress in their creased cheeks, furrowed foreheads, and wrinkles around the eyes. If they were dropped into a far-away country, as some of them have been since 1941, they would be easily recognized as American—one almost dares say Yankee. In the cities this rural type changes, lets its belt out and perhaps softens a little, but the Valley-born city man is rarely completely detached from the soil.

They have a native shrewdness and ingenuity which makes them good mechanics, and they took readily to TVA's training programs for construction workers. They were anxious to better themselves. If one family in a neighborhood got an electric stove, or washer, or feed-cutter, or brooder, other families immediately wanted them. If one farmer got good results with the new fertilizer, others were eager to try it. It wasn't necessary to argue about these things. It was necessary only to demonstrate them.



With electric refrigeration Robert Rogers in Lincoln County, Tennessee, can now sell Grade A milk.



And his daughter now finds it fun to sew.

Looking back over the first decade one can see that the Valley was ready for something to awaken it to more vigorous life. It was not ready, however, to be taken over by even a benevolent outside agency. It had no desire to be a colony, however well administered. It wished to be independent or nothing—wished it as a section, as states, as counties and townships, and as families and individuals.

TVA might have been a wretched failure if it had actually been what some careless observers supposed it to be, or what some enthusiasts wanted it to be. If it had gone into the Valley with the avowed purpose of "uplifting" the inhabitants, it would have pauperized a small minority and estranged the great majority. The sober truth is that there were some signs of a rather tactless attempt at uplift in the first year or so. They soon ceased. TVA has made its way in the Valley because it took the people into partnership. Long before 1936 it had arrived at the policy expressed in the report for that year:

The planning of the river's future is entrusted to the TVA. The planning of the Valley's future must be the democratic labor of many agencies and individuals, and final success is as much a matter of general initiative as of general consent.

TVA was born in a time of depression, when widespread hardship could be avoided only by the use of the Federal power to do many things *for* the citizens of the states. Private enterprise was paralyzed and state power was not sufficient. But TVA was so situated and its authority was so used that it ceased very early to do things for people and passed into the phase of enabling people to do things for themselves.

No other policy could have worked well in the Valley—and this is possibly a way of saying that no other policy will permanently work well in any part of America. The Valley people were, and are, proud. They had rather be poor than dependent. The

essence of TVA, from their point of view, was that it opened up to them the road to independence.

Their first benefits from TVA came in the form of wages. More than 40,000 were on the payroll at the construction peak. But these wages were not regarded as doles, and were not doles. They were a fair exchange for skill and muscle. If a man got a cashable fraction of a Congressional appropriation he could feel that he had earned his pay. This was no leaf-raking job.

It was a job that inspired self-respect. It made imaginations soar. If men could build things like those dams, what couldn't they do? There probably wasn't one farmer or laborer who worked on a TVA project who didn't get a wider vision out of it.

TVA came to stand for more than a single kind of power. It was the power of man over his environment—of all men, of little men as well as big men, of unlettered men as well as the graduates of universities. It was co-operative power. The Valley people saw how out of the fathomless confusion of a beginning construction project the most exquisite sort of order could come. They saw how men working together, the planning engineers and the building engineers, skilled mechanics and laborers, could do a magnificent thing.

It was easy to believe that similar methods would work in other fields. And this is, in fact, how TVA's wider task was carried out. In the sweep of things beyond the routine of construction the key was co-operation. There was little that TVA did alone.

It worked with other governmental agencies—scores of them. It worked with voluntary agencies—dozens of them. It put energy into those local agencies that are by far the most potent influences for American democracy, and it drew energy out of them. When a rural co-operative was formed it put new responsibilities on individuals. They had to grow, and did grow, to new dimensions.



*"We were a long time getting it, but electricity certainly helps on this farm."
Thomas Williamson is a northern Alabama farmer.*



Ten kilowatt hours of electricity will make a pound of aluminum—twenty kilowatt hours will give running water on a farm for a month.



A tenant farmer for nine years, J. E. McFerrin bought the place in 1939. Poor soil is now good soil. An electric seed-cleaner enables him to sell wheat for food, and clover and vetch for seed.

The Valley and its People

Villages and cities buying or building distribution systems for TVA power had new problems thrust upon them. Demonstration farmers found themselves equal to a more exacting game with the soil and the weather. Community-owned refrigerators or harvesting machinery demanded organizing skills that had long lain dormant. TVA brought libraries to its camps, and when the camps were gone some counties continued the libraries on their own money and their own initiative. Scientific control of disease in the camps stimulated a demand for a better public health service.



Neighbors dropped in when the county agent came to see about the demonstration cover-crop.

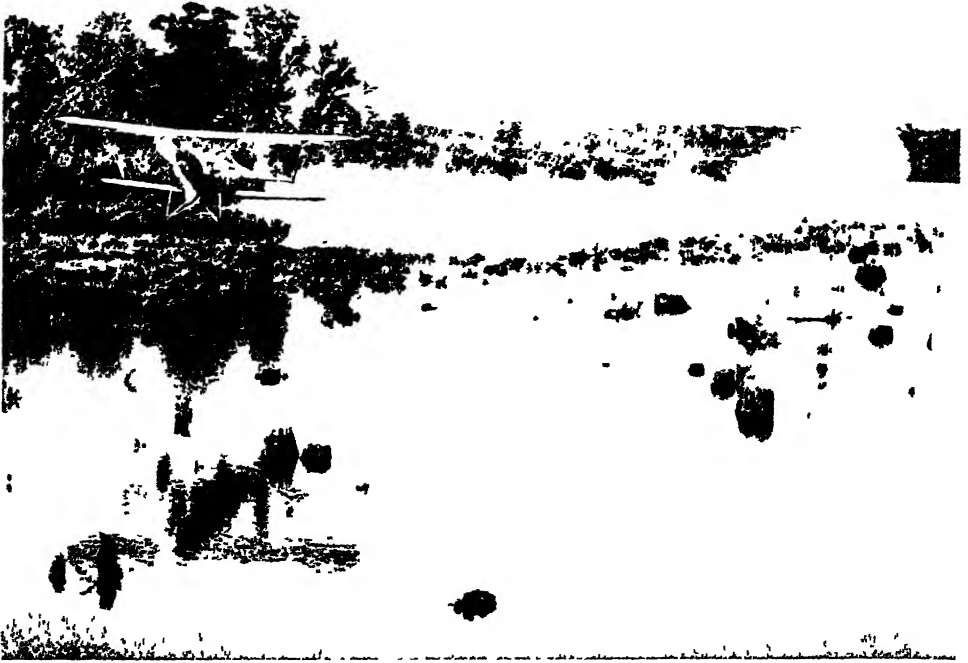
"The People in Said Basin"

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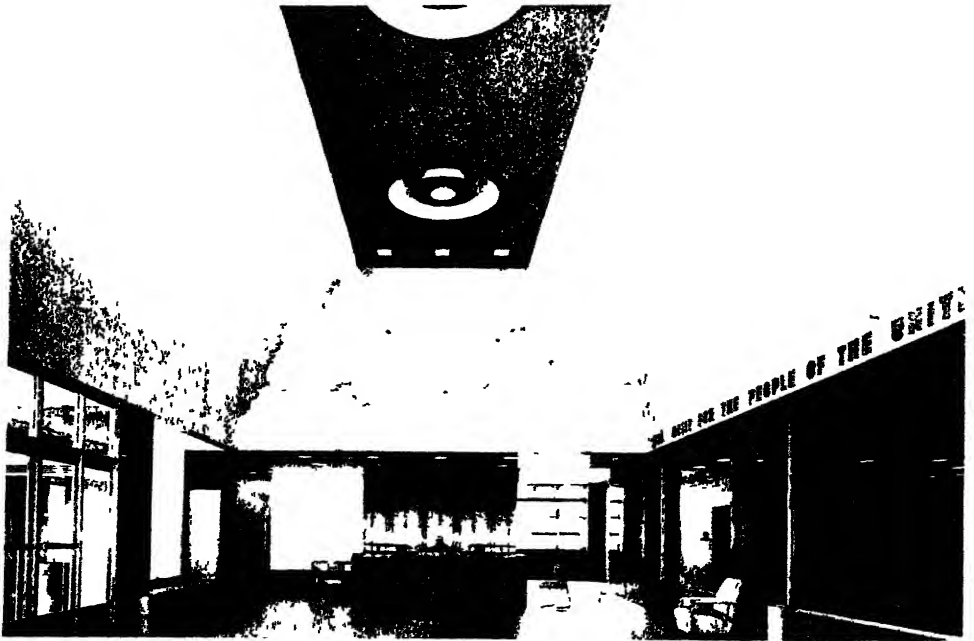
All over the Valley little men have been growing into bigger men because they have had bigger things to do. TVA has helped as much as by standing aside as by butting in. The TVA cars, going up and down on their lawful errands, are not formidable symbols of Mr. Whiskers. They are likely to contain folks who may be familiarly addressed as Joe or Frank, and who can talk cotton, tobacco, corn, fruit, eggs, milk, livestock, fertilizers, electrical gadgets, schools, malaria, prices, the business situation, and military strategy with anyone who is interested. The composite TVA man



As a result of these TVA book trucks for isolated workers, some of the states developed library service for rural areas.



Dusting the shores of Wheeler Lake with an insecticide from an airplane in the war on malaria-bearing mosquitoes.



That the public may inspect what it has built—visitors' reception room at Chickamauga Dam.



Chattanooga and Moccasin Bend from Lookout Mountain battlefield.

The Valley and its People

either was born in the Valley or has settled down to grow up with it. He is one of the people among whom he circulates, and he does not put on airs. When it is hot he is not afraid to take off his coat and show his suspenders.

A normally skeptical outsider, acquainted with the ways of propagandists and properly suspicious of "spontaneous" popular movements which suddenly spring up equipped with chairmen, mailing lists, and money to hire halls, might wonder at the way the



Built in the town of Norris for a construction worker. With the help of nature, an inexpensive cinder-block house makes an attractive home.

Valley rallied behind TVA when TVA was in trouble with Congress. But one such outsider, at least, after ten years of observation, hasn't been able to detect the hand of TVA behind the scenes pulling the strings.

In the early spring of 1943, when Senator McKellar was trying to introduce a monkey wrench or two into the TVA machinery, this outsider attended a protest gathering in a small Alabama city. It was not a mass meeting but rather an informal committee session. There was a preliminary dinner at the leading hotel, and a good deal of talk about plowing, weather, local business conditions, and local politics. After dinner a legal representative of TVA, present by invitation, made a speech, in which he carefully explained what would happen if the McKellar proposals were adopted. Questions were asked—by a farmer, an editor, a banker, a merchant, a doctor, and so on. There was some difference of opinion about how to proceed. Some wanted to persuade Mr. McKellar and some wanted to scare him. There were no varying opinions as to the objective, which was to do all that could be done to keep TVA a constructive agency and save it from being turned into a vehicle for political patronage.

This was obviously a group of people whose emotions were deeply rooted in old ways, and whose thoughts were their own, not TVA's. They were individualists. Some had been on principle opposed to public ownership and originally hadn't cared for the TVA experiment. They were now united to the extent that they thought they had discovered in TVA an agency and influence which was favorable to men's happiness and well-being in the Valley. They were friendly to it as they might be to the river itself or to the Great Smoky Mountains.

They weren't consciously rejecting anything they had learned at home, at school, or in church. They weren't seeking a new way



Norris Dam. Reservoirs are lakes, and lakes are good fun.



"In what used to be Allen Hooper's pasture, near the mouth of Polecat Hollow, the city is fixing up a real nice swimming place." The Guntersville, Alabama, GLEAN, July 22, 1943.



Just another fish story.



An air-conditioned factory, good wages, and protection from malaria bring health and beauty to these Decatur, Alabama, young women.



Visitors at the dams they built.



A free-way is a modern highway. Adjoining property-owners are welcome to cultivate the right-of-way if they agree to keep their own land free of hot-dog stands and billboards.

of life, but the old way made richer and safer. They wanted better homes, better schools, better churches.

Each of them represented some kind of private enterprise that could be more successfully operated when electricity was cheap and plentiful than when it was scarce and expensive. Each of them owned something he was trying to hang on to and add to. But each of them was glad, without any prompting, to own a share in dams, generators, switchboards, and wires that could never be anybody's private property. Private business in the Valley seemed to them better off because there was this much public business.

At this particular meeting organized labor wasn't represented. Indeed, organized labor might have had its quarrels with some of those present. But any labor leader in the Tennessee Valley would have endorsed the resolutions adopted. Here was one principle that cut across traditional, sectional, and economic lines.

The Valley people, in short, have accepted TVA. They have a pride in it. They do not yet know quite what they will do with it, any more than the pioneers knew what they would do with the new lands when they started coming down the valleys of the Holston, the Clinch, and the French Broad. But they can see dawn breaking above the Smokies and streaming westward to the Mississippi. The adventure lies ahead. Like their ancestors, resolute and unafraid, they press forward.



The quiet of Chickamauga Reservoir offers rest and recreation.

8.

And Other Valleys

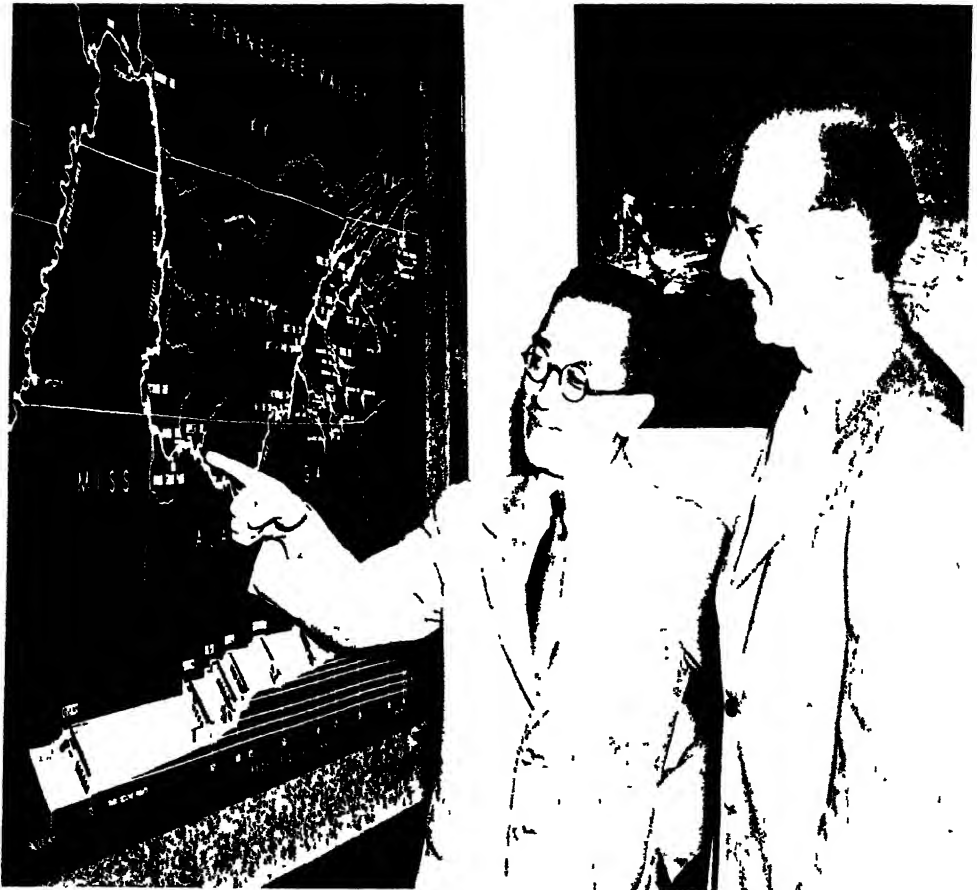
SOME of us, perhaps, have stumbled on the remnants of old stone dams and millraces in the woods of New England, or Pennsylvania, or, for that matter, Tennessee. They are likely to be off the main roads, because the main roads are going places and are in a hurry. The approaches to them may be overgrown with bushes or tall young trees. The dams crumble a little more when each new spring's ice comes down. But they were big for their day and place. The stones at the head of the old penstocks weren't put there by pygmies, even though they had oxen to help them. Work went into them—and dreams.

As with the old dams, so, perhaps, in time, with the new ones; as with the little ones, so, perhaps, with the big ones. The utmost ingenuity cannot keep some silt from washing into the reservoirs, diminishing by slow degrees the quantity of water they will hold. A leaf falls into the pool today at Norris or Hiwassee, and that is a part of the process of change. It will take a thousand years, but it will come.

When you have made cornmeal by pounding corn with a stone, or when you have made lumber by swinging an axe or riding one end of a rip-saw, a water-wheel turning the grinding machinery or operating a buzz-saw is new and shiny and a gift of the gods.

Electric power created by running a powerful stream of water through gigantic turbines is newer, shinier, and much more the gift of the gods. We have no reason to suppose that it is the ultimate step in the production of power for human use.

So when we consider the future of TVA it is wise not to put our faith entirely in dams, powerhouses, and electric transmission lines. These are instruments that serve well for certain purposes at this moment. As far as we can tell, they will continue to serve for a generation or so. But they are not permanent. Only the intangibles are permanent.



From Chungking to Chickamauga. Former Ambassador Hu Shih visits Chairman David E. Lilienthal.

Even while the electrical age continues in approximately its present technical phase we cannot treat hydroelectric power as its last word. Even if all the potential water power in the country were publicly developed and publicly distributed, there would still be about twice as much steam power to compete with it. And every year more steam comes out of each pound of coal, with no miracle of atom-splitting to help it out.

We have to face another sober fact. This whole apparatus of dams, powerhouses, power lines, laboratories, experimental plants, factories, improved farm implements, terraced lands, young trees set out on eroded slopes—all this, while it remains and functions, is an implement with which either good or evil can be accomplished.

Let us imagine that Hitler had won his war and that he had decided to apply to the Danube the technical lessons learned in the Valley of the Tennessee. He could build dams, harness the river's power, improve it for navigation, enrich the soil, create productive industries. The inland lakes would mirror hate and fear, but the generators would turn just as smoothly. A thousand soldiers, a thousand slaves could be supported where before there was sustenance for only five hundred, or one hundred.

Or let us merely picture the Tennessee Valley as a setting for monopolized industry, with its farm lands, made rich by improved phosphates, held in large corporate tracts and tilled by landless men. Let us imagine, if it is not too great a strain, a reactionary administration, or series of administrations, in Washington, that would permit such things to happen. They might happen if a distorted variety of "free enterprise" were turned loose in the Valley.

Even without any antisocial intentions—almost by accident—so much of the power of the Tennessee might be devoted to large-scale industry that the independent farmer and the small-scale maker of this and that would not have a chance to grow and prove

himself. Just now TVA is serving some very large industries indeed, particularly the aluminum industry. In time of war it is to the public interest that it should do this. But even the Tennessee River has a limit to its strength. If the experiment with people is to continue, a balance must be struck when the war is over. Power must be rigorously set aside for the uses of the man raising dairy cattle on a hillside farm, for the truck gardener in the bottom land, for more and more community refrigerators and quick-freezers, for the little manufacturer and the little storekeeper, for the housewife's washing-machine and the old lady's radio.

These uses of electricity, and many others which might be mentioned, are essential to the creativeness and freedom of life in the Valley. They serve to remind us that though we may produce machines that are automatic we cannot make our democracy automatic.

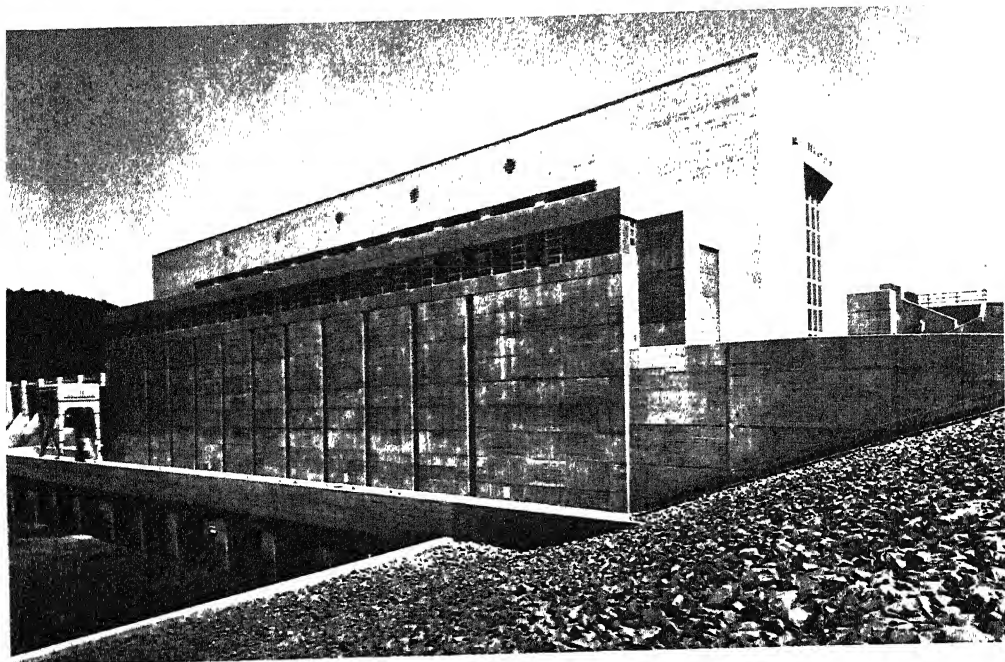
TVA has made a remarkable beginning, but no more than a beginning. It has been interrupted by a war which had to be won if democracy were to survive here or anywhere else in the world. When the war is over, it must be rededicated to its original purposes. It must get back to serving the little men of whom democracy is made up: on the farm and elsewhere, by making their independent labor productive, by opening up wider markets in which they can buy and sell, by ameliorating the conditions of their lives. TVA has served these little men with great fidelity, as far and as long as circumstances permitted. It has lent them dignity. It has made them enormously potent in war. It must resume the task of making them potent for peace. It will do so if it is not frustrated or interfered with. It is for the people of the Valley and of the nation to see that it is not frustrated or interfered with.

It is ideas that endure, even when men die and machinery becomes obsolete. The idea behind the Pyramids, the idea behind the

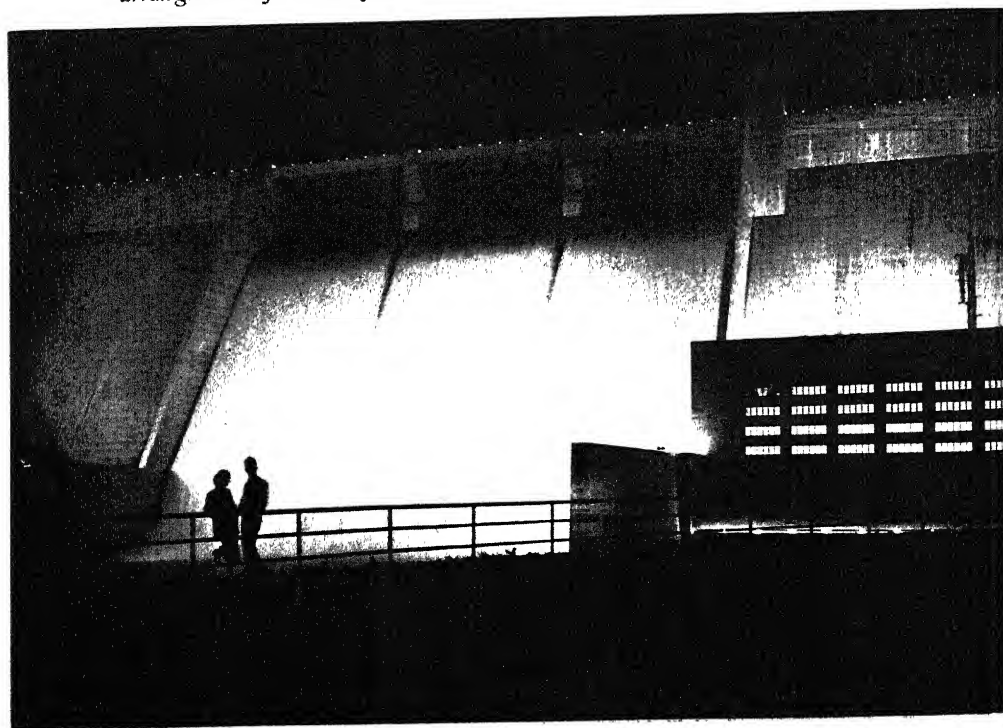
Hanging Gardens of Babylon, the idea behind the ancient irrigation canals of Mesopotamia, the ideas behind the Parthenon and the tall buildings of New York City. good ideas and bad ideas, persisting regardless of the survival or non-survival of material things, persisting because they grew out of human nature.



In a position of repose characteristic of rural people, an assistant county agent talks farm talk to a country boy.



TVA architects have learned how to produce striking beauty with the balanced arrangement of necessary components. Guntersville Powerhouse.



TVA is such an idea, not an arrangement of metal, rock, and concrete. Out of our democracy, in a period of economic depression, in a disturbed and revolutionary world, between two earth-shaking wars, came a great vision. It was a vision of the future of a Valley, but it was more than that. Indeed, if it were only that it would not be significant. If a way has not been found in one valley to do things in other valleys, and on plains and in mountains, we might as well pass on. We might as well say there are dams in the Tennessee basin, some imposing peaks in Colorado, notable sea-coasts along the edges of Maine and Oregon, and mild climates in California and Florida; all these phenomena would be of interest, but they would not tell much about the future of the Republic.

An attempt has been made in this book, in pictures and in text, to show what the TVA idea is. Perhaps we can now say that it is a kind of wedding of the ideas of Alexander Hamilton and the ideas of Thomas Jefferson. It is Hamiltonian because it originated in the national capital and called for an extension of the Federal authority. The courts found justification for this extension in the Constitution, but it did result in some things being done that the Federal Government had never done before. Washington came down to the grass roots and did things to them, in some cases literally, spending money, changing people's lives. The family that lived in the old cabin at a certain spot above the Norris Dam might have desired to remain there. Owners of rich land above the site of the Douglas Dam may have wanted to go right on cultivating it. Some of them said they did. They were not allowed to. Washington said no. In other fields TVA, armed with a law and two Supreme Court decisions, transformed people's habits, willy-nilly. This looked like centralization. It caused a good deal of alarmist oratory.

But when everyday practices and ultimate objectives are discussed, it is the gaunt, red-haired man from Monticello who comes

riding down the road. He doesn't like big cities, he doesn't like too much far-away government, or too much government of any kind. He likes farmers and has a lot of good advice for them, based on what he did with his own Virginia acres. He likes to see people stand on their own two feet and dig, chop, hammer, or whittle out their own place in the world. And while Alexander Hamilton makes great plans and exults at the sight of factories so big that no one could ever get around them on foot, it is Thomas Jefferson who goes up and down talking to people, showing them how, and encouraging neighbors to work together of their own free will. TVA is Jefferson, too.

This is regionalism, to give it the long, dull word. It is talking across the fence with the man next door, not going to Washington to get someone to come down from there and talk to him. It is problems of the neighborhood handled in the neighborhood. It is lines of communication and mutual aid, not running out of the Valley to a far-off capital and then back again, but up and down and across the Valley.

This collaboration is not set up in a pyramid of authority. There is nothing military here, with generals at the top and privates at the bottom. It is a matter of who can best do the job, and usually there are several jobs to be done at once, and all in some way connected. If mosquitoes have to be subdued, the entomologist is needed, but so are the doctors and the public health people. If the task is to get a fertilizer, the chemist is boss, but the man who knows practical farming has to say how it is to be used. There is a pooling of knowledge, experience, and hard work. And this pooling occurs within an area big enough to support the necessary specialists and special agencies and small enough to have common problems.

These facts are the essence of TVA. Potential energy, carried by a river system, fixed the limits of the experiment. The pre-

existing social and economic conditions established the nature of the experiment.

The principle, if not the exact pattern, can be applied elsew here. It might be applied in the basin of the Colorado—a river flowing deep in the earth through arid highlands, coming down at last to a rich delta country. It could be applied to the Columbia, with its two mighty dams, the irrigable land of its headwaters and the as yet infant industrialism of its downstream areas. It might be applied to the Connecticut, the Delaware, the Arkansas, and other valleys still.

We need not even stick to rivers. The Great Plains, for instance,



From Cottonfields to Commerce. The land-locked town of Guntersville, Alabama, became an inland port when the dam was built.

have many problems common to the whole area, as the Great Plains Committee reported in 1935. The Tennessee basin is not the only section of the South that is amenable to regional treatment. Upper New England is a region. California is a region. Or we can make regions in terms of cattle, of cereals, of mines, but of course, above all, in terms of people and the way people earn their livings.

Mechanical power of some sort will be needed in any regions we care to map out—needed in large units in some areas, in smaller, more scattered units in others, but always needed. And power will



Where there are floods to be controlled, there's water for power. Pickwick spillway.

always be a factor of control over men's lives. Herein lies the argument for public regulation and for a large measure of public ownership. Changes in the derivation of power, whether from water or from steam or from some new source not easily foreseen, will not affect this argument. It is affected, however, by the manner in which control is exercised. A nationally-owned power system, with, so to speak, a master switch in Washington, would be a frightening thing for a Jeffersonian to contemplate. On the other hand, the Jeffersonian might be willing to accept a power system physically interconnected at all possible points, with certain essential national policies nationally agreed upon, but with all sorts of local agencies, both governmental and co-operative, having a say as to the local uses of energy.

TVA has not gone far enough to prove that this sort of thing is practicable. It has not had time enough to prove it. Give it ten years more and it may establish the point beyond all doubt. In the meantime let us look about us. Another TVA experiment in a different sort of area would be worth trying. It might, indeed, be one of many projects for the profitable employment of labor when the greatest demobilization in our history begins. Men who have fought for the future might like to build for it.

There is an instinct for building—what Thorstein Veblen called the instinct of workmanship. It applies not only to dams and machines but to the uses of the land, to the things that grow upon the land, to the breeding of animals, to the farmer's barns, to his house and his wife's kitchen. It applies to human lives, in family groups on the land and in neighbors getting together to labor, or eat or talk. What is a region but a greater neighborhood? What is the spirit in TVA that sometimes sets the pulse to beating like the sight of a flag if it is not the great thrill of neighborliness? Men do like to have their human relationships run smoothly. To make

them do so is a skill and an art, concerning which we are learning something in this adventure of the Tennessee Valley.

The Valley is one of many valleys. It is a small part of a vast country. It has been half asleep. Now it is waking. The old democracy comes back in modern dress. We need not be afraid here of the tyranny of the State nor of the tyranny of monopolistic private enterprise, not if we are wise. We need not be afraid of them in any valley.

This is the Valley. This is the song of the water moving.



"... Life, Liberty, and the pursuit of Happiness."

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* Since the first printing of this book in 1944 Chapter Two has been entirely rewritten and two new illustrations have been provided. The photograph of the atom-splitting plant at Oak Ridge, Tennessee, on page 28 replaces the picture of the electro-carbide furnaces at Muscle Shoals, and the picture of Kentucky Dam on page 32 replaces that of the generator room at the Watts Bar Steam Plant.

A NOTE ON THE PRINTING OF THIS BOOK

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